THE TRADE REVIEW

AND WESTERN MACHINIST.

WEEKLY EDITION, Vol. XVI—No. 43. } CLEVELAND, O., OCTOBER 27, 1883. { MONTHLY EDITION Vol. I.—No. 10.

Engineering.

Bridge over the Monongahela River, Pittsburgh.

Mechanical engineers and others will be especially interested in the illustration herewith given of the fine bridge recently completed over the Monongahela River at Pittsburgh. This bridge is located at the foot of Smithfield street. It is approached from either end on a gentle up-grade, over long and paved abutments and iron viaducts, built of heavy plate girders, of which there are six parallel lines reaching from the abutments over light piers to the river piers proper. These iron viaducts span the wharves on either shore, and carry the roadway on top, so that the supporting girders cannot be seen from above. The tall towers form ornamental portals through which the roadway continues to the river spans, which are of the Pauli type. The design of the portals and towers is in the elaborate Renaissance style, fittingly applied to give a marked and solid appearance to a bridge, airily and lightly constructed of steel and iron.

The roadway is 22 feet 10 inches in the clear, and there are two sidewalks 10 feet in the clear. The full width of the viaduct is 43 feet 6 inches, and on the river spans 48 feet. The length of span, between the abutments is 1220 feet.

The channel spans are proportioned to carry in addition to their own load, an extraneous load of 4,500 pounds per foot of bridge and the floor system can bear up a load of 40 tons on a 20-foot wheel base. The viaduct can carry in addition to its own load 9,000 pounds per lineal foot of bridge, and the same concentrated load of 40 tons. No part of the superstructure is thereby strained to more than one-fifth of its breaking strength.

The total cost of the bridge is about $400,000. There are about 10,500 cubic yards of masonry in the piers and abutments, and 1070 tons of wrought iron, 740 tons of steel and 200 tons of cast iron (for the towers) etc., were needed for the superstructure. We are under obligations to the American Engineer, Chicago, for the use of the accompanying excellent view of this bridge.

Steel and Iron Tests.

Nitric acid, says Electricity, will produce a black spot on steel; the darker the spot the harder the steel. Iron, on the contrary, remains bright if touched with nitric acid. Good steel in its soft state has a curved fracture and a uniform luster; in its hard state a dull, silvery uniform white. Cracks, thread or sparkling particles denote bad quality. Good steel will not bear the heat without falling to pieces, and will crumble under the hammer at a bright-red heat, while at a middling heat it may be drawn out under the hammer to a fine point. Care should be taken before attempting to draw it out to a point that the fracture is not concave; and should it be so, the end should be filed to an obtuse point before operating. Steel should be drawn out to a fine point and plunged into cold water; the fractural point should scratch glass. To test its toughness, place a fragment on a block of cast iron; if good, it may be driven by the blow of a hammer into the cast iron; if poor, it will crush under the blow. A soft, tough iron, if broken gradually, gives long, silky fibers of leaden-gray hue, which will twist together and cohere before breaking. A medium, even grain, with fibers, denotes good iron. Badly refined iron gives a short blackish fiber on fracture. A very fine grain denotes hard, steely iron, likely to be cold-short and hard.

Manufactures.

CLEVELAND.

THE Cleveland Milling Co. have ordered a 20x60 Reynolds-Corliss engine.

A. B. LYMAN & Co. report a busy season in the manufacture of electric annunciators, etc.

THE Cleveland Electric Motor Co. already have orders for over 1,000 of their useful invention.

THE 300 employees of the Joel Hayden Brass Co. are working full time, indicating a very fair trade.

THE big bar mill started to work double turn last Monday night.—The mills are experiencing considerable difficulty in getting coal.—[South Cleveland Advocate.

THROUGH the instrumentality of the excutors of the estate of Amasa Sone, of this city, a creditor of the defunct Union Steel Co., of Chicago, to the amount of $1,900,000, a reorganization of that company has been effected with $4,000,000 capital.

ACCORDING to the report of Receiver Fayette Brown, of this city, Brown, Bonnell & Co.'s receipts for September were $166,-251.73; disbursements $190,-120.14; balance on hand October 1, (including $36,671.21 carried over from August), $12,802.80.

GOBEILLE & BRO. justly claim to do the largest pattern business West of New York. They are especially busy in making designs for stoves and have lately adopted the plan of making castings as well, so as to avoid the annoyance and delays arising out of unskillful setting up of their patterns by those not familiar with them.

MR. JOHN N. GLIDDEN, Secretary of the Republic Iron Co., a member of the ore firm of Glidden & Manning, and one of the lessees of of the Arnold furnace, at Niles, last Monday confessed jndgment in favor of the Republic Co. for $111,760.-29. Attachments amounting to $2,500 were issued on Friday against the Arnold Furnace Co. Mr. Glidden has stood very high as a business man of integrity and good judgment, and the wish is universal that he may be able to weather his present embarrassments.

OHIO.

THE two manufactories of the Eagle Lock Co. (at Terryville Conn., and Geneva, O., respectively) report trade fair. The Western branch employs 75 men and ships very largely to Western states.

THOUGH trade is somewhat dull at present with the Enterprise Machine Co., of Geneva, they report inquiries now coming in more encouragingly. They employ 70 hands and are running full time.

IT is denied that the Youngstown Steel Casting Co. will take out their machinery and use their buildings for other purposes. The enforced idleness of the works was caused by the change in the tariff. They are now considering the question of putting in a new process of making steel.

THE Columbus Rolling Mill has been sold to a Milwaukee syndicate, headed by General Irwin McDowell, for $175,000. The purchasers are the owners of a patent by which they convert ordinary pig iron into muck bar without the necessity of putting it through the expensive process of puddling.

To remove the ambiguity of a recent item in this column we gladly publish the following: "We see in yours of October 6, under the head of Ohio, this: 'The Burton (Geauga County) Handle Co., have moved their machinery to the Novelty Works, and the new firm, Brown & Collins, had taken possession.' One would infer from this that Brown & Collins had possession of the Handle Co.'s business, which is not the case. Messrs. Brown & Collins have leased the Old Mill formerly occupied by the Handle Co. and the Handle Co. have charge of the handle business, as heretofore, and have leased the Burton Manufacturing Co.'s works and manufacture in connection with handles, revolving horse rakes, shovel plows, cultivators, &c. Yours respectfully, The Burton Manufacturing Co., Burton Handle Co., lessee."

CINCINNATI.

SPECIALLY REPORTED.]

R. McBeth & Co., of 185 West Pearl street, are quite busy. They are making a specialty of upright drills, wood lathes, self-oiling saw arbors, and "Rival" cross-cut saws.

The John H. McGowan Co., 134 West 2d street, reports a good Fall trade. They make a specialty of steam power and hand pumps, also plug tobacco machinery, railroad water station, and general supplies.

Dietz & Hollingsworth have succeeded J. Dietz & Co., of 602 West 5th street, and have removed their business to 189 and 191 West Pearl street. They report business good and outlook for a fair Fall trade.

The Cincinnati Wire Nail Co., manufacturers of all kinds of plain and barbed wire nails, are very busy and running double turn. At present they have 15 nail machines in operation but are soon to double their present capacity by adding 15 more.

The Inventors' Manufacturing Co., 150 West 8th street, have purchased the entire interest of Messrs. J. E. Hirst & Co. and the Farmers' Manufacturing Co., and propose to at once increase their capacity for manufacturing and add such lines of goods as the trade requires. Capital stock, $100,000.

The Medart Patent Pulley Co., St. Louis, have moved into their new and spacions building on North Main street. They have increased their capacity to 300 pulleys per day, and have but recently sold the right of California to parties there, receiving royalty on all pulleys made by them. Trade at their branch store, 2d street, Cincinnati, is very good. They expect soon to keep a stock of 6,000 on hand here of different sizes.

The Cincinnati Steam Heating Co. are enjoying an excellent Fall trade and are pushed to their utmost capacity. A list of some of the large contracts they are at present working on was lately published in this journal. More recent orders are: Henry Martin, residence, Cincinnati; Batavia Infirmary, Batavia, O., and numerous local contracts. They have a reputation for doing none but the best of work and find but little competition with the common apparatus and work, so much of which is on the market.

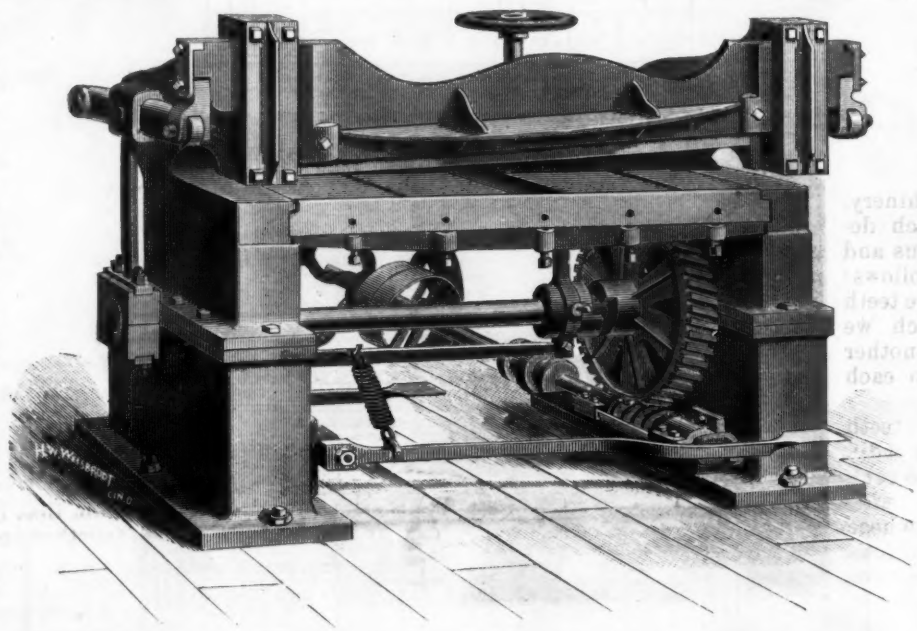
Warren Warner, of 714 West 8th street, manufacturer of hydraulic, steam and hand elevators, is engaged at present in constructing elevators, with "Warner's patent safety device attachment" for the following parties: J. T. Warren, two power freight elevators; G. V. Stevenson & Co., one; Jas. Morrison & Co., two: Masonic Temple, Peoria, Ill., one passenger elevator; N. Cooper, Maysville, Ky., besides more in Peoria, Ill., and Chattanooga, Tenn., and other cities. Mr. Warner is also engaged extensively in the manufacture of prismatic or illuminated sidewalk plates, coal shutes and counter-balanced cellar doors.

O'Neal, Price & Co., 124 West 2d street, manufacturers of water-proof and oak-tanned leather belting, are quite busy, having a good Fall trade. Although established so late as March, 1883, they already rank with the leading and representative houses of the city, and are recognized as a powerful rival of the oldest and strongest competitors in this line of trade. They have just completed for the Maumee Rolling Mill, of Toledo, one belt 150 feet long, 4 ply and 24 inches wide, weighing 1,460 pounds; one 160 feet long 3 ply, 20 inches wide, and one 150 feet long, 3 ply, 18 inches wide. This firm is also agent for The Gutta Percha and Rubber Manufacturing Co.'s gum belting, hose and packing.

IN GENERAL.

BY a recent reorganization the Union City (Pa.) Iron Works become the Warden Machine Works. They make portable and stationary engines a specialty.

SINCE their fire of some time ago, the Horton Manufacturing Co, Jamestown, N. Y., have entirely refitted their works and provided themselves with a model office. They report more sales of their specialties this year than ever before.



COMBIN D SPLITTING AND QUARING MACHINE.

Combined Splitting and Squaring Shears.

We herewith illustrate a new device for cutting and splitting sheet metal. This machine combines many valuable features that will be be appreciated by all metal-workers. It is built in several sizes, to meet the requirements of the trade, and where it is required to trim very large sheets an extra device is furnished. The power shears have an extra lever attachment for adjusting the blades or cutting through a required distance of the sheet. The gearing is of the worm and screw form, which gives a steady, quiet and powerful motion. The clutch is arranged to be operated either from front orback. The eccentrics are so constructed as to be readily adjusted to compensate for loss of wear in the blades. The arms and links are so connected to the gate that as the blade descends the radial motion of the arm brings the blades still closer together instead of being forced apart as in the ordinary shears. The bed is made adjustable so that the blades can be quickly placed at their proper distance after grinding; it is also provided with rollers, the upper surface of which is slightly above the top of the bed; this feature enables the sheets to be easily moved and at the same time takes the destructive wear off the edge of the lower blade. The machine is provided with all necessary auxiliaries, such as platen to clamp the sheet, gauges, &c. The weight of the machine is 3,000 lbs., and it will perform a duty of cutting 24 feet per minute of any desired thickness up to No. 6, or ¼-inch iron. A strip may be cut from a sheet up to 12 inches wide of any length. A sheet can be squared up to 36 inches. It is made by McKeown & Davis, 196 East Front street, Cincinnati, who make several different sizes. They report trade good on the same and gradually increasing. They make extra heavy machines for rolling mills and are now filling an order for the Licking Rolling Mill Co., of the large size. Several of these machines are in use in Cincinnati, among others by the Mosler Safe & Lock Co., Fisher & Lods, manufacturers of hot air furnaces and ranges, etc.

COMMUNICATIONS from practical men are always welcome, and will be promptly printed.

WALKER'S SYSTEM OF GEARING.

A NOTEWORTHY PAPER BY MR. JOHN WALKER, OF CLEVELAND.

Read before the Engineers' Club, Cleveland, Oct. 9, 1883

Mr. Chairman and Fellow Members:—There is an old saying, "Expose your ignorance if you would be wise." Should this be my misfortune, or possible fortune tonight, the writer shall feel the assurance at least that he has done his best, and shall simply be content to tell something of what he knows about gearing.

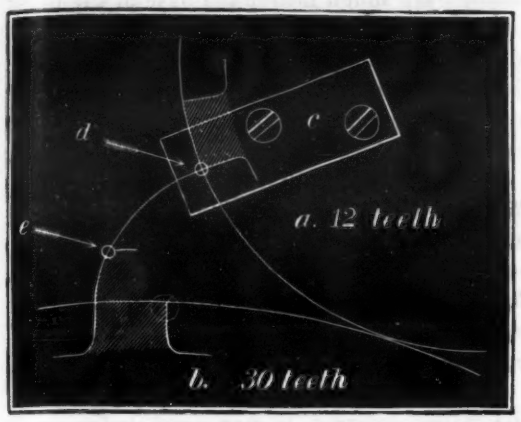


FIG. 1.

Gearing, according to Walker and Webster, is a train of wheels in machinery. There are many kinds of gears each designed for their particular conditions and duties. They may be classified as follows:

SPUR GEARING is that class whose teeth are parallel to their axes by which we transmit power from one shaft to another whose axial lines are parallel to each other.

BEVEL GEARS are that class whose teeth are set at various degrees from their radii, the shafts being at right angles to each other.

ANGLE GEARS are that class whose teeth like bevel gears are set at various degrees from their radii, but their axes are set at any angle either acute or obtuse or in other words any angle different from 45 degrees.

MITRE GEARS are that class whose teeth are set at an angle of 45 degrees from their radii,

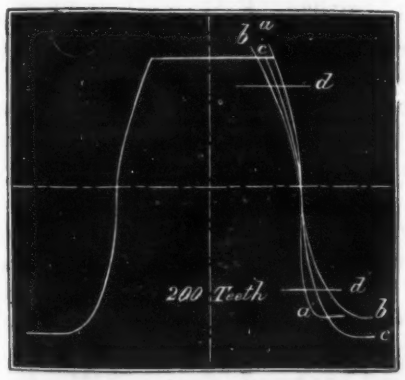


FIG. 3.

the shafts always being at right angles.

HUNTING TOOTH gears are usually classed with mitre gears. The odd tooth introduced into this class of gears to interchange the tooth positions does not usually make enough difference to classify them as bevel gears, although in the strict sense they are bevel gears.

INTERNAL GEARS are that class whose teeth like spur gears are parallel to their axes but are convergent to their centres that they may receive pinions inside their circumferences.

A RACK is a series of teeth on a continuous straight line. It can be considered a spur gear of infinite radii.

SPIRAL GEARS are that class whose teeth, or perhaps more properly speaking, threads, are cut or chased at any desired angle to suit the required angle of the shafts and the required speed. The shafts of this class of gearing, however, cannot be on the same plane, their difference being that of the radii of both spirals, or worm and wheel as they are termed when one is larger in diameter than the other.

THE PROPORTIONAL RADII of a gear or pinion is the distance from the centre to the proportional circle, or pitch line, and (the pitch being the same) is proportional to the number of its teeth.

PITCH LINES, are the touching circumferences of two or more gears which are to act on each other.

PITCH OF A GEAR is the distance of the centres of two contiguous teeth, measured upon their pitch line.

LINE OF CENTRES, is a line drawn from the centre of one gear to the centre of another when their circumferences touch each other.

FACE OF A TOOTH is the curved part of a tooth, which imparts impulse to another gear.

FLANK OF A TOOTH is the lower part of a tooth which receives impulse from another gear.

LENGTH OF A TOOTH is the distance from the root or base to the extremity or point of the tooth.

BREADTH OF A TOOTH is the measure of a tooth in a spur gear, parallel to its axis, and at right angles to its radii.

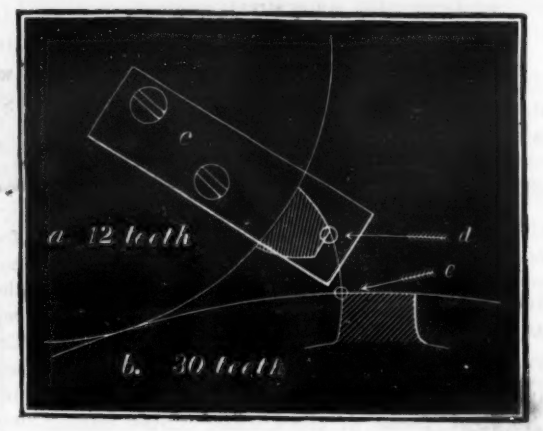


FIG. 2.

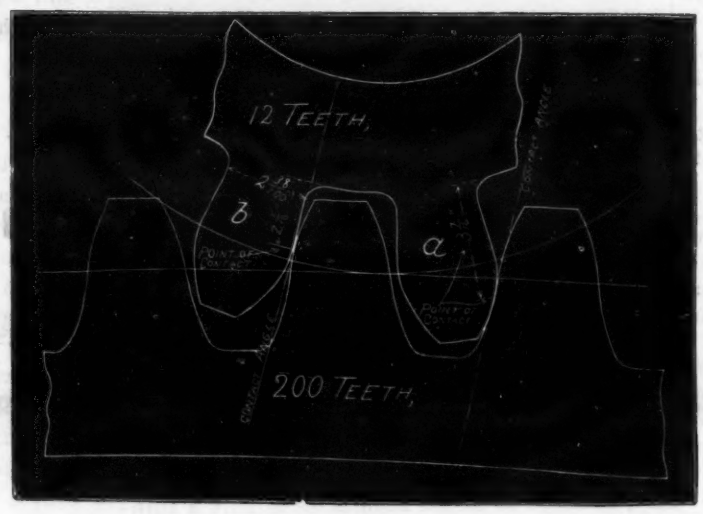


FIG. 5.

When two gears act upon one another the greater is called the wheel and the lesser the pinion. Where the teeth of gears are of the same piece with the body of the gear they are properly called teeth; when they are each of a particular piece they are called cogs; but are comprehended under the general term teeth. The durability of the teeth of gears under the same circumstances is nearly in a direct proportion to their breadth, and inversely, as the pressure. The strength of the teeth of gears is directly in proportion to their breadth, and as the square of their thickness, and inversely as their length. For example, if we double the breadth we only double the strength; but if we double the thickness, or in other words, double the pitch, keeping the original length and breadth, we increase the strength four times, but as the length of the teeth commonly increases with the pitch this circumstance must be taken into view, for if we double the thickness and length at the same time (as is common in practice) we only double the strength, in which case the strength is directly as the pitch.

The stress on the teeth of gears is as the pressure, and inversely as the velocity. For example, if the pitch lines of one pair of wheels move at the rate of 1,000 feet per minute and another pair of gears, in every other respect under the same circumstances, moves at the rate of 500 feet per minute, the stress on the latter is double that on the former.

The speeds of gearing must of necessity vary greatly, this depending entirely on the nature of the work the gears are intended for.

The friction of teeth in gearing as they approach the line of centres is much greater than in receding from it. This action is more perceptible when a machine becomes worn; it causes irregularity in its movements in consequence of the action in approaching the line of centres tending to spread the axes of the wheels. (This will be spoken of more fully hereafter). While the action, in receding from that line, tends to draw their axes together and consequently occasions more irregular action, friction, and wear in the machine; therefore the teeth ought if possible to have clearance in entering that they may come to a gradual bearing. This is especially advantageous in cast gears. In all cases where it is admissable the numbers of teeth in a wheel should be prime to

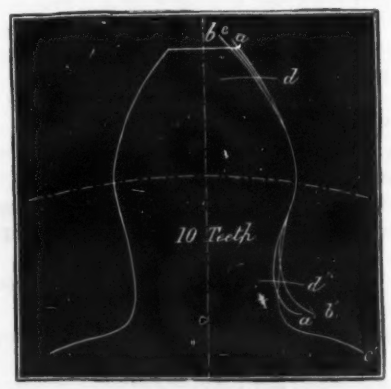


FIG. 4.

the number of teeth in its pinion. * *

Having thus described some of the primary definitions and principles in gearing, those not conversant with this subject will be better able to understand the system about to be explained.

What is so noisy and annoying as ill-constructed gearing? Go where we may in almost every manufactory, mill, or shop we will find more or less of irregularity in this particular branch of work. Here a pair of gears are at work writhing and grinding in agony, ever and anon threatening to tear themselves asunder.

Go into the pattern rooms of many of our workshops, and you will find the secret to noisy gearing—distorted teeth of every conceivable shape and form, the majority being made by rule of random

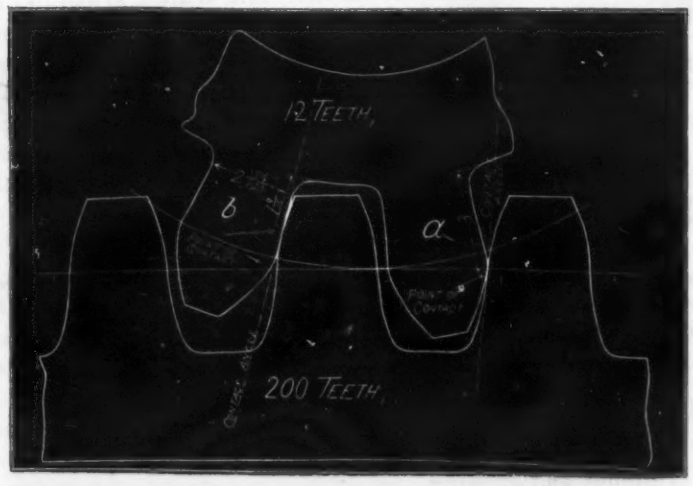


FIG. 6.

Continued on Page 6.

THE TRADE REVIEW AND WESTERN MACHINIST.

ESTABLISHED 1868—SIXTEENTH YEAR.

Devoted to the Manufacturing, Scientific, and Mechanical Interests of the Country.

PUBLISHED EVERY SATURDAY.

Office—Rooms 30 and 31, Board of Trade Building, 122 Water street,

CLEVELAND, OHIO.]

TELEPHONE 852.

WILSON M. DAY, - - - - - - - Editor.
FRANK N. CARTER, - - - Business Manager.

SUBSCRIPTION, (POSTAGE INCLUDED). { Weekly $3.00 per Year. Monthly .60 per Year.

☞ Advertisfng Rates Furnished on Application.

Entered at the Post Office at Cleveland as second-class matter.

PROBLEMS FOR YOUNG MECHANICS.

We have been much interested the past week in looking over the specimen examination questions used in connection with admissions to the clerical force of the United States Patent Office. Let some of our younger mechanics read them over and see how many they can answer:

What is the difference between a fixed and a movable pulley? What are the conditions of equilibrium in each?

What properties render metals suitable for casting? Mention some metal unsuitable for casting, and state why it is so.

What is a universal joint? Describe some form.

Given a lever with a long arm of 20 feet, and a short arm of 5 feet; to the latter is attached the rope from a wheel 3 feet in diameter, on whose axle, 1 foot in diameter, winds a rope leading to a weight lying upon an inclined plane having a face of 3 feet and altitude of 1 foot. To the long arm of the lever is applied a power of 10 pounds; what weight will it counterbalance on the inclined plane? The long arm of the lever is moved through a space of ten feet; through what space will the weight be moved?

Given a level track, a load of 33,000 pounds, and traction or resistance of 1,650 pounds, required the horse-power to move the load at the rate of 20 feet per minute.

State and explain the difference in results consequent upon a projectile striking a pane of glass—

(a) With high velocity.

(b) With low velocity.

What is a machine?

Can a machine be self-actuating? Give reasons for answer.

Why does an iron ship float, and what are the conditions necessary thereto?

Describe the difference between cast-iron, wrought-iron, and steel, and explain at least one mode of producing each.

Name the four principal modes by which electricity may be excited.

Explain the difference in principle between a high-pressure and a low-pressure engine.

What is the purpose and principle of operation of the pendulum, the governor, and the fly-wheel?

Name the substances which are the most refractory to heat, and state their uses in the arts.

Explain the difference between a valve and a stop-cock.

Give in succession the names of the distinguished inventors concerned in the invention and perfection of the steam-engine.

What is a spur-wheel, a crown-wheel, a bevel-wheel, an endless screw or worm, a differential screw, a differential or compound axle, sometimes called the "Chinese wheel"? What is a crank, a cam, a fly-wheel, and their respective offices?

State the ways in which friction may be diminished.

Certainly these questions, though fundamental, cover a wide range of mechanical knowledge, while at the same time they bear directly upon the duties of the average clerk or examiner in the Patent Office. If this is a fair index of the requirements of aspirants for public office proposed by Civil Service reformers, practical men everywhere will wish them God-speed in their efforts.

ALBERTITE OR ANTHRACITE?

As we expected, the reported "find" of anthracite coal in Summit County, O., which was widely heralded as overthrowing the theories of the Ohio Geological Survey and opening up an entirely new industry for the State, turns out to be something savoring strongly of "salting." In reply to inquiries as to the probability of finding coal below the Massillon and Akron seams, we have received the following note from the State Mine Inspector:

STATE OF OHIO.
OFFICE OF INSPECTOR OF MINES.
COLUMBUS, Oct. 20, 1883.

TO THE EDITOR:

I have your letter of the 18th inst., inclosing clipping from the Cleveland Herald in regard to the alleged discovery of a six-foot vein of coal, 200 to 300 feet below the lower or Massillon bed. I have no faith in the report. My idea is the prospectors have struck into the Erie black shale, and have been deceived by its resemblance to coal. It is not impossible but highly improbable that coal will ever be met below the geological horizon of the Massillon or Akron seams. Yours truly,

ANDREW ROY.

With this decided presumption against the correctness of the story, it is not surprising to learn that practical coal men themselves nowpronuonce it extremely doubtful. We understand that Akron parties had the money in hand to purchase the tract for $10,000 and that the bargain was about concluded, when, suspecting that after all there might be an African in the woodpile, they suggested that $2,500 be paid down and the balance in installments conditional upon coal being found, the whole, in that event, to be paid within a year. To this the owners of the land objected for reasons best known to themselves, and so the matter dropped. With the judgment of the State Mine Inspector that he has "no faith in the report;" with the remark by Professor Orton, of the State University, that the so-called anthracite is only a thin sheet of albertite or mineral pitch which "has been mistaken for coal a great many hundred itmes," and with the refusal of the owners of the land to place any financial confidence in their discovery, it would appear that the way of the "Ohio anthracite" was exceedingly hard.

P.S.—Since the above was written the report comes that an analysis of the coal shows at least 80 per cent. of carbon. We shall await further developments with interest.

GEARING.

We do not exaggerate the importance of the paper by Mr. John Walker, printed elsewhere, when we say that it will be read with as deep interest by the mechanical world as anything in current technical literature. Mr. Walker's life-long study of the subject of gearing and his practical acquaintance with its design and manufacture, as General Manager of the Walker Manufacturing Co., of this city, entitle his views to more than ordinary weight; and when it is considered that his system is somewhat different from generally accepted views on the subject, it will be seen that the discussiou borders very closely on the controversial. Mr. Walker deserves commendation for putting the reader at once on familiar terms with the subject by reason of his clear, concise and exact definitions. Aided also by excellent diagrams, which have been prepared especially for this paper, he makes the entire subject at once luminous and striking.

Machinists will readily distinguish the differences between the Walker and the Willis (Odontograph) systems, and nothing would be gained over a careful reading of the text and study of the diagrams by an attempt to epitomize these differences. It is sufficient to say that, proceeding upon his new principle, Mr. Walker claims for his system several advantages of direct interest to all users of machinery, viz.: No adopted rolling circles are used, the pitch circles generating for themselves. The improved form of tooth gives greater strength and obviates working out of gear. The points of contact are much nearer the base of the pinion tooth, giving increased strength. The gears made on this principle are, in practice, absolutely interchangeable. By means of the Walker Wheel Scale the form of tooth for any particular gear needed can be delineated by any person with ordinary mechanical ability. Other advantages will appear on closer study.

In practice, Mr Walker's system has received the endorsement of the best mechanical minds both in this country and abroad, and though he has looked over the entire field for objections, he has found no good reason why his theory is not the correct one.

The paper referred to was read before the Civil Engineers' Club of Cleveland, O, October 9, and was received with unusual interest and thoroughly discussed by the members present.

RECENT ACHIEVEMENTS IN ELECTRICITY.

Verily the practical uses of electricity are beyond the power of man to forecast. The wonders accomplished within the past ten years seem only the prediction of what is yet to come. Take the developments of simply the past few weeks as an example: When the process of photo-engraving was practically demonstrated, it seemed as if the acme of quick and accurate reproduction was reached; but here we have an entirely new process, invented by a Washington man, Henry Lauten, by which electricity is to be made to do the work of the sun, and of course instantaneously. It is claimed that the raised plates of ordinary form thus produced are perfect in every detail and that the depth of lines can be regulated at will. If these claims are met—and a company has been incorporated in Washington to demonstrate them—it will work a radical revolution in the engraving trade.

Another signal triumph of the electric spark—made public only the present week— is the photogaphing of sound vibrations. Incredible at first as it may seem, Mr. George G. Rockwood, a well-known New York photographer, has succeeded, by the aid of electricity, in taking views of the diaphragm of a telephone while vibrating from the human voice, not one of the more than twenty plates obtained having had to exceed one-twenty-thousandth of a second in which to be begun and ended. The negatives, submitted to rigid comparisons, showed infinitessimally small but clearly marked differences in the position of the fine metallic point mounted on the center of the reversed side of the diaphragm, in its contact with and separation from the point of the conducting wire, involving the opening and closing of the electric circuit.

Illustrative, finally, of the tendency of fresh discoveries to overthrow the generally accepted *dicta* of science, we may mention the fact that a Cleveland electrical company is now in correspondence with a New York inventor who claims to have devised a battery which not only does not consume its constituent elements, but, as a matter of fact, can not, because the only element used is water! Not a particle of acid is employed in the generation of the electrical

current. We do not say that this can be done; we only say that it is claimed to have been done.

INVENTORS' RIGHTS.

The first attempt to combine the interests of the 150,000 inventors of the United States for mutual protection was made at New York the present week, in the form of a National Convention of Inventors and Owners of Inventions. In his preliminary circular, the Secretary made the striking statement that "it is not generally known, but it is a fact, that the railroads, the grangers, the mill-owners, and other large manufacturing companies, although at enmity with one another as to other interests, are united in their opposition to the patent laws, and in the sentiment that there should be no property rights in patents." To offset this combination the American Patent Protective Association was formed, with E. M. Marble, Commissioner of Patents at Washington, as President; F. W. Warner, of New York, Secretary, and a full list of minor officers Among the objects of the Association, as set forth by the preamble, are the following:

To foster inventive talent; to secure to inventors the rewards accorded to them by the patent laws; to establish bureaus of scientific and legal information and publication, and to promote the introduction of valuable discoveries or improvements in the arts; to establish and maintain for convenient use libraries of works or publications, scientific, mechanical or legal, relating to patents or inventions; to awaken in the community a due appreciation of the relations of inventions to our national progress, counteract tendencies subversive of a just national policy toward inventors, and to secure such legislation as may be requisite to afford adequate security to property in inventions; to adjust disputes between inventors, and to co-operate with inventors in foreign countries in effecting needed changes in foreign patent laws.

In the line of the policy above outlined, it is proposed to memorialize Congress to rid the present patent laws of ambiguities which work injustice to inventors; to create a special commission to make these revisions; to employ skilled persons to prepare a digest of all the matter in the library of the Patent Office; to see that the Patent Fund be forever held sacred to the uses for which it was intended; to make of the Patent Office a separate department, and to establish within the office a United States Court, composed of three gentlemen of experience in law and mechanics, to whom all appeals shall be made and whose decision shall be final. The Association certainly has a broad field before it, and its progress in bringing about these reforms will be watched with interest.

FLAMELESS combustionis not a new thing in the world, but its value and the office which the flame fills have been overlooked. In a recent address before the British Institute of Mechanical Engineers, Thomas Fletcher, F. C. S., demonstrated by experiment that flame and smoke have no connection; that the visible part of flame is nothing more nor less than solid particles in a state of incandescence; that, in fact, flame is a fuel in an intermediate state, between perfect combustion and smoke, and that it may either go on to perfect combustion or degenerate into smoke, according to the conditions present.

WHEN the Lord Lieutenant of Ireland went up to Potrush recently to inaugurate the new electrical railroad, the engine, to the horror of the projectors, refused to budge. Upon investigation it was found that somebody had diverted the current from the rails into the earth by tapping it with a piece of iron. The obstruction removed, the train moved off successfully.

ON THE Brooklyn bridge the waste power caused by the strain of the car-propelling cable over the great wheels is taken up by an ingenously constructed plate and drum, and the power thus obtained is used for switching the cars at the end of the route.

ST. LOUIS is soon to have a Free Mechanical Library and Reading Room. A good move.

Hints from Practical Men.

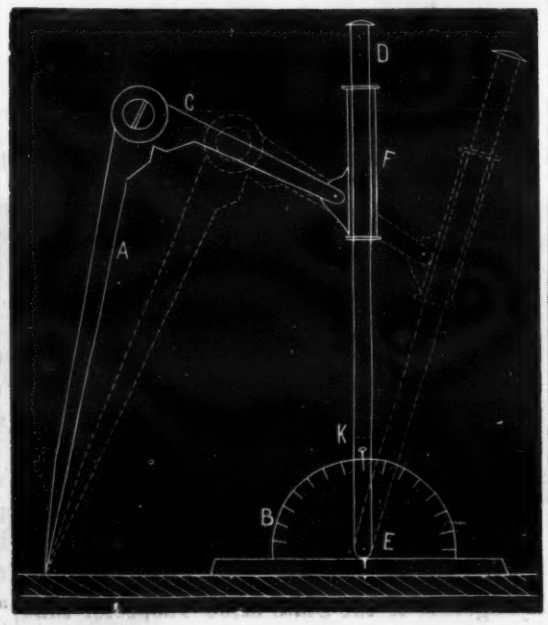
Suggestions to Beginners—How to draw an Ellipse.

BY WILLIAM WARD.

SPECIALLY CONTRIBUTED.]

In my last I showed how to draw a circle without a center. In this I will briefly show

How to draw an Ellipse.—Let us suppose that the center is a round rod smooth and true, suspended from a frame or hinged from a base, but so that you can change it from perpendicular, setting it at an incline or out of perpendicular to suit what you want to do. The arm of the compass is connected to center bar by a tube that will move freely and truly around or up and down the center. The other arm of the compass touches the surface upon which the figure is to be described. Set the center bar perpendicular or square from the base and the point will make a circle. The least inclination of the center lengthens one diameter, or draws the ellipse. The more the incline, the more the change in diameter, the pencil bar sliding up



the center bar to allow the pencil to rise and fall to the surface of the paper.

The annexed diagram will be readily understood. A is the free arm of the compass. B is the graduated scale for setting the incline of the center bar (D) to any angle. C is the arm of the compass which connects to the sliding tube (F). E is a metal standard. K is the thumb screw for setting the center bar. The dotted lines show the position of the instrument in describing an ellipse.

In larger work it may be desirable to discard the compass and rig up a second bar connected with the center bar, this second bar to be used in describing the ellipse. It would also be necessary to provide a frame for holding the center bar in position, as the thumb screw at the base would not be sufficiently strong.

There may not be anything especially novel in this device to older hands. but with the writer, at least, it is original.

CLEVELAND, Oct. 24, 1883.

Lubricating Oil in the Machine Shop.

BY E. F. DIETERICHS.

SPECIALLY CONTRIBUTED.

Many intelligent and practical machinists cling to the old-line theory that one kind of oil should answer all purposes in the shop, and they hold to the use of lard-oil exclusively, and not without reason provided the lard oil in use is of the very best quality. It is, however, very difficult at the present day to get pure lard-oil for machinery purposes; it is generally adulterated in endless proportions with cotton seed oil, while inodorous and much cheaper than reasonably good lard oil and is likewise adulterated with so-called mineral sperm oil, which perverted ingenuity successfully and expressly produces for adulteration so perfect that the uninformed are unable to notice its presence in lard oil. There is also an endless number of mixtures of the lower grades of lard-oil, or lard-oil and cotton seed oil mixed, with all kinds of mineral oils for adulteration, and the less lard-oil there is used in such mixtures the viler is the quality used to secure by its prominent odor a more ready sale.

Cotton-seed oil is a very useful article and has an excellent future, but it belongs to the class of drying oils and, like all of them, is an inferior lubricant, as it is equally inferior as an article of food, notwithstanding of late the claims of high recommendation for such use by manufacturers and the barefaced offering of it to farmers and dairy-men, already sufficiently instructed in the dollar-and-cents-chemistry of oleomargarine-butter, for adulterating the cream to make increased quantity and profits on butter.

All the animal and vegetable oils, even the best, will decompose under frictional heat, and as they are obliged, on account of their high fire test, to absorb a considerable amount of heat before they are able to vaporize and part with it into space, they become decomposed by it and with their decomposed parts form, with the abrasions of the metal and the dust in the shop, gummy accumulations on the bearings which retard and drag on the motion and finally injure the machinery. For cutting screws and bolts and drilling in metal, however, they are unsurpassed, and even their poorest and cheapest grades are well adapted for that purpose. Cutting screws and bolts and drilling in metals creates frictional heat by the contact of two metallic surfaces of different density in motion, but the motion is not a long continued one and a new surface of softer metal in the shape of screws and bolts, etc., is constantly presented to the surface of the denser metal the drills and dies are made of, and the frictional heat here developed is more readily absorbed by fatty oils on account of their viscosity and excellent heat-absorbing qualities and enables them, with the screws or bolts laid aside, to dispose of it more leisurely.

With bearings of machinery this is different, as the surfaces of the metal remain unchanged in close contact with each other while in motion, and the rapidly evolved frictional heat requires to be disposed of by the lubricant as fast as it is produced, lest the heat be absorbed by the metal and, accumulating more and more, cause it to become over-heated and injured. The fatty oils, and even lard-oil, with their high fire test are, therefore, not the best lubricators for lubricating machinery. They will decompose and form gummy deposits, and the higher the fire test of an oil the more heat it is obliged to absorb and accumulate before parts of it become enabled to vaporize with it into space. Machinists are well aware of the inconvenience caused from the gumming of lard-oil on machinery not in constant use and when hurriedly in need of using a machine, for instanee, a planer, of being delayed by the necessity of first cleaning and getting it into working order. Now, if lard-oil alone is to be used in a shop, it has to be of the very best quality to be equal to the requirements of lubricating the machinery where the very best quality of lubricants is required and such good and expensive oil would then also have to be used for drilling and cutting. It pays to use a good efficient machinery oil expressly and intelligently manufactured for that purpose, and which can be obtained for little more than half the cost of any reasonably good lard oil, and also to keep a supply of some cheap quality of fatty oil for drilling and cutting purposes. The economy and benefits from following such course will soon outweigh the little inconvenience of keeping and using more than one kind of oil around the shop.

Experienced mechanics are well aware of these facts and know the advantage of using oils to suit the requirements of different kinds of machinery.

CLEVELAND October 22, 1883.

THE Ball Engine Co., Erie, Pa., have just shipped a 9x12 automatic engine to Providence, R. I. They are exhibiting one of their engines at the Boston Exposition, which gives the best of satisfaction in runninig the Fuller electric light. They are about shipping a 10x12 engine to San Francisco. The 30 employees are given all the work they can do.

SPECIMEN copies of the TRADE REVIEW free.

WALKER'S SYSTEM OF GEARING.

Continued from Page 3.

and then others fitted to them as a change of speed may have been required, albeit the fault is not at all times with the makers of gearing, for very often the purposes and intentions of the maker are frustrated by either flimsy foundations, shafting out of line or level, or gears not geared to their proper depth.

A story was told some time ago of a man receiving a mortise wheel uncogged (not having been specific in his order as to cogs) and a pinion for same. He geared the pinion teeth into the mortises of the wheel, and then complained of their not running well, and making a great deal of noise. It seems from experience, to have successful gearing, that it is as necessary for those who use it, to care for it, as much as the maker ought to care for its proper construction. The construction or forming of teeth in gearing of various kinds and for various purposes is necessarily an extensive one. I do not propose to go into details, or the fundamental principles involved in gearing in general, but more particularly to explain a new and useful system of gearing, which is the result of much research and careful practical application. Thousands

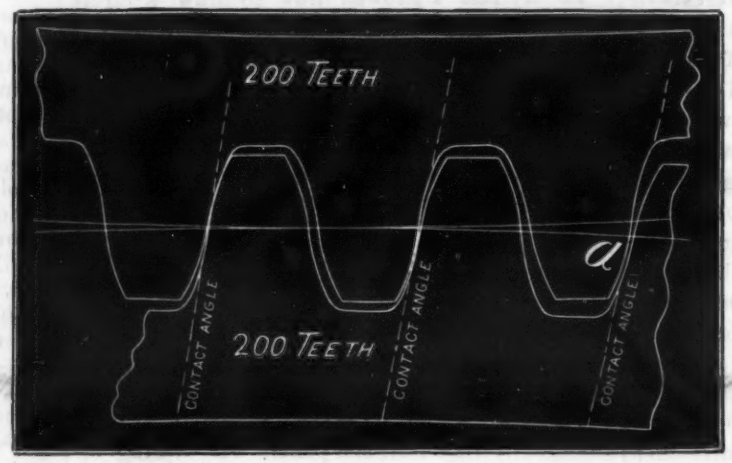


FIG. 7.

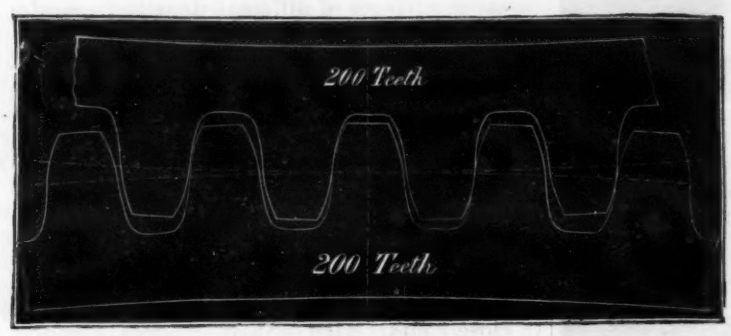


FIG. 10.

of gears have been determined by this system in this country and in England, and many flattering testimonials have been received of their easy and almost noiseless working.

The curves from which this system was determined are known as the epicycloid, for the faces of teeth, and epitrochoid, for the flanks of teeth. Figures 1 and 2 will serve to explain the method of generating the curves. No adopted rolling circles are used. The pitch circles generate for themselves in this system, as they do in all gears in actual service. In figures 1 and 2, two templates *a* and *b* are provided, representing gears with pitch diameters respectively of 12 and 30 teeth, six inch pitch. A piece of wood C, is attached to template A, in figure 1, to carry a marker D, to generate face of tooth for gear of 30 teeth: the marker D representing side of tooth of 12 tooth pinion will generate a face for gear of 30 teeth that will precisely contour with flank of 12 pinion, when said flank is generated with a marker placed at E. In figure 2 the piece of wood C is attached to template A to support marker D outside of pitch circle. The position of marker represents end of tooth and will generate a flank for a gear of 30 teeth that will contour with face of pinion tooth when said face is generated with a marker placed at E. By this method of generating any pair of gears intended to work together will work absolutely correct, with true velocity ratio, and if necessary, without any clearance at sides or base of teeth. Gears thus generated only work in pairs. In practice the objection to this is that gears so determined will not interchange. The system we have before us overcomes this difficulty in a very simple manner, and at the same time gives as near an approximation as possible to the true curvature, as generated by pitch circles already explained.

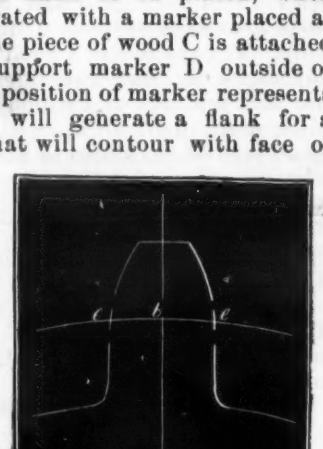


FIG. 15.

Suppose, as in Figure 3 that the pitch circle is for 200 teeth, six inch pitch, the curve AA is generated as already described by using a generating circle equal in diameter to 200 teeth, six inch pitch, the curve BB is generated as already described by using a generating circle equal in diameter to 10 teeth, six inch pitch. These lines AA and BB are the two extreme forms of teeth for a gear of 200 teeth, six inch pitch, assuming 200 to be the highest and 10 the lowest number of teeth to be used for general purposes. The line CC is a medium or average line of the two extremes, which is found by using nearest radii to the curves. Accepting the distance from pitch line to intersecting lines D D, as that portion of the tooth that is most in contact, it

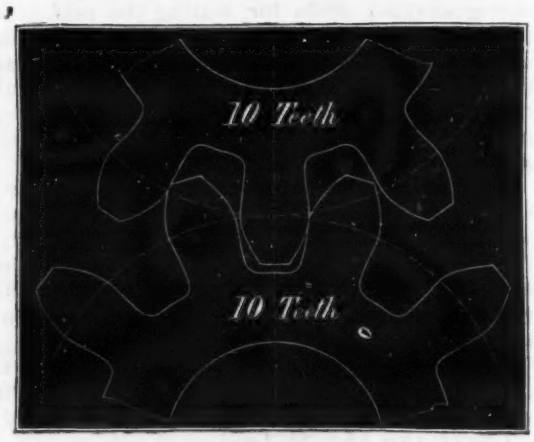


FIG. 9.

is necessary to accept this intersecting point where the average can be taken, on account of having to allow clearance at bottom of tooth. It will be understood that the average line C C extends beyond *D D*. It is impracticable, however, to average that portion of flank below *D*, on account of having to give clearance at base of teeth. That portion of face above *D* is caused to be slightly smaller than the average. This is a practical advantage, as it allows that part of face of tooth above *D* to get within the pitch circle of the opposite gear before coming in contact. This is necessary in cast gearing on account of inaccuracy of pitch in patterns, or straining of teeth in molds during casting. Figure 4 is a similar illustration to Figure 3, and the foregoing explanation is adapted to both illustrations save that the pitch circle is for 10 teeth, six inch pitch, the curve *A A* being generated with pitch circles of 200 teeth, six inch pitch, and curve *B B* with generating pitch circle of 10 teeth, six inch pitch. It must be understood that whatever number of teeth the gear may contain the 200 teeth and 10 teeth generating pitch circles must always be used. The average being taken in all cases the gears will interchange without deviating materially from the true epicycloidal curves for face and epitrochoidal curve for flanks, or true curvature as generated with pitch circles only, of which this is the nearest practical approximation.

Those who are conversant with this subject will see at once a material difference between the system here explained and that known as the Willis or Odontograph; he adopting a single generating circle, the diameter of which is equal to the radii of the smallest gear in the set. Why such a generating circle is used on a pair of gears of 200 teeth, intended to work together, I am at a loss to know, when the true form can only be generated by the two pitch circles being rolled together. I presume, by the above, that the 200 is prepared to work with 10; but the 200 is not prepared to work with one of its own size, or any other but the 10. By the Willis system we have a wedge-shaped tooth for all gears which have a strong appearance; but in practice this amounts to nothing, for they have less teeth in contact than

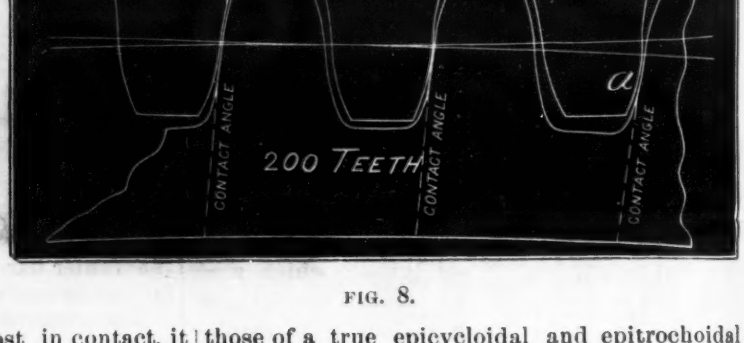


FIG. 8.

those of a true epicycloidal and epitrochoidal form generated by pitch circle, which, although smaller at the root, has more teeth in contact, distributing the strain over a larger portion of the rim. At the same time, there is not the objection in working out of gear, as in the Willis, which is caused by the thrust from the wedge form of tooth wearing the bearings. It is evident that the thrust is as the incline of the surfaces of the teeth or the contact angles to the line of centers of both shafts. In pinions the Willis system has the reverse; viz., a very weak tooth at the root. Pinions ought to be as strong as possible (without injury to their form) on account of having but one or two teeth in contact.

Figures 5, 6, 7 and 8 are drawings made to compare the Willis system with the Walker system; figures 5 and 6 representing a pinion of 12 teeth with a wheel of 200 teeth, both being drawn at the same relative position to each other that a fair comparison may be got of the forms of teeth and their points of contact.

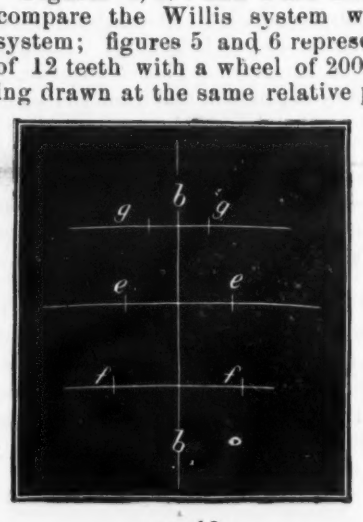


FIG. 13.

In the Willis system the points of contact will be seen to be much further from the base of the pinion tooth than in the Walker system. In the tooth A, Fig. 5, we have for Willis 3 7-16 in, as against 3 inches in tooth A, Fig. 6, in the Walker. In the tooth B Fig. 5, we have 2 1-16 inches in the Willis as against 1 9-16 inches in

tooth B, Fig. 6, in the Walker. The thickness of pinion tooth at base in the Willis is 2 38 100 inches as against 2 54-100 inches in the Walker system. The limited distance of these points of contact from base of pinion teeth and the increased thickness of same gives a pinion much more advantage in the Walker than in the Willis system. In the same proportion as the points of contact are nearer the base of pinion teeth so they will be further from the base of the wheel teeth, thu bringing the greatest strain or leverage on th wheel teeth which will in all cases be better able to bear it than the pinion teeth.

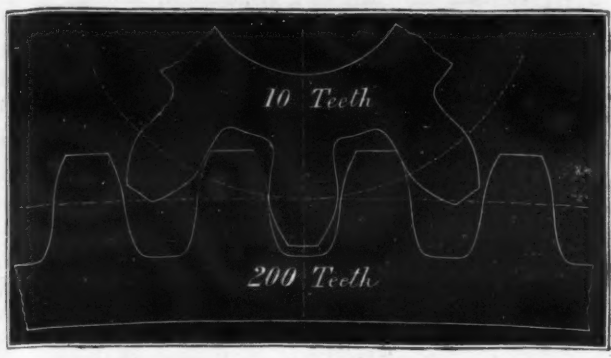


FIG. 11.

Figures 7 and 8 represent a pair of wheels of of 200 teeth, both being drawn at the same relative position to each other, Figure 7 being from the Willis system and Figure 8, from the Walker system. The angle lines form tangents to the points of contact and show clearly that there will be an excess of thrust on the teeth, also the bearings in the Willis wheels. At the point A, Figure 8, the teeth will be seen to be much nearer contact than in Figure 7, showing that there are more teeth in contact or that they remain in contact longer.

Figures 9, 10 and 11 are illustrations of extreme numbers of teeth in gear. Determined by this (Walker's) system, it will be observed that the form of teeth in the pinions of 10 teeth are all alike; also, the form of teeth for gears of 200 teeth are alike. These two extreme numbers of teeth have been selected for illustration, as they are really the worst cases to determine. All other numbers of teeth are as the difference of their diameters, the difficulties lessening as the gears approach an average of the two extremes. In delineating the forms of teeth, and finding the respective radii for the average line as explained in Figure 3, the writer used templates of 6 inch pitch for gears of 10, 12, 15, 20, 30, 50, 100 and 200 teeth, also a rack. The forms of teeth were found for each gear by using pitch circles of 10 and 200 teeth respectively, as in Figure 3, for the generating circles, they being chosen before as the limits. To determine the teeth of gears by this plan would be tedious. To obviate this the writer has arranged a very complete and convenient chart or scale, known as Walker's Wheel Scale, whereby any person with ordinary mechanical ability may delineate in a few moments the proper form of tooth for any particular gear needed. Figure 12 is an illustration of chart or scale. From the portion A we get the length of tooth for any gear. From the portion B we get half the thickness of tooth on pitch circle; from portion C we get half thickness at root for any gear; from portion D we get half thickness of tooth at point. These half thicknesses are set off on each side of center or radial line, as in Figure 13. Figure 14, is a complete illustration of three teeth determined from the scale for a spur gear of 6 inch pitch and 60 teeth. The pitch arc *A A* being struck with proper radii, we draw radial line *B B* from scale set off A C and *A D* forming lengths of flank and face respective y; from scale set off *B E B F B G*, on each side of radial or center line, forming thicknesses at pitch line, root, and point of tooth,—then with radius C *H* for flank of tooth taken from scale for a gear 6 inch pitch and 60 teeth intersect arcs at C from *E* and *F* on both sides of tooth. These intersections indicate position for path of centers for striking the flanks of the teeth. Then with a radius C I for face of tooth taken from scale, for a gear 6 inch pitch and 60 teeth, intersect arcs at C from *E* and *G* on both sides of tooth. These intersections indicate position for path of centers for striking the faces of the teeth. The fillets at the roots of teeth are struck with radii provided for on scale. In determining gears with less than 30 teeth, as in Figure 15, arcs E E struck with radius equal to half thickness of tooth are used across pitch line, allowing the arcs forming flanks and faces of teeth to blend with them. The forms of teeth from this system is such as to roll easily on each other without jarring. Joshua Rose after investigating this system says, in Cincinnati Artisan of Dec. 1st, 1879: "The general results obtained by the Walker system are, that in small gears there are more teeth in contact than would be the case if rolling circles, equal in diameter to the smallest gear of the set, were employed, while the point of contact taken at any position of a gear and pinion is nearer the base of the pinion tooth, giving a longer operative length of flank than would be obtained by striking the flank curves from a point on the pitch circle, intead of from a point on the addendum circle, or point of the tooth." This addendum point was clearly illustrated at *E* in Figure 1 and D in Figure 2.

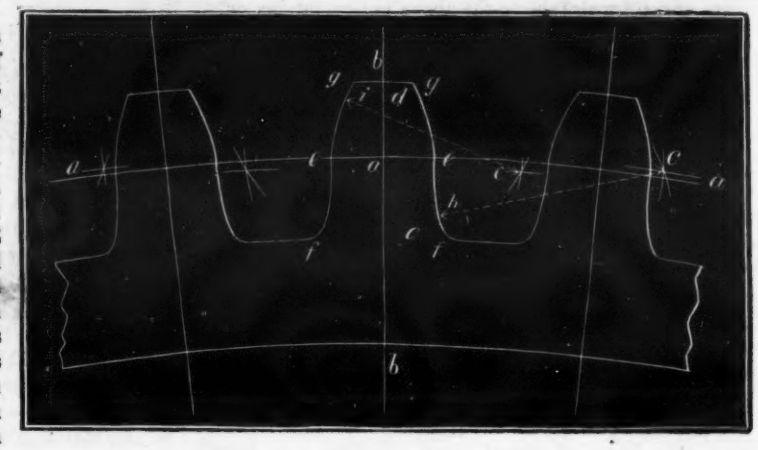


FIG. 14.

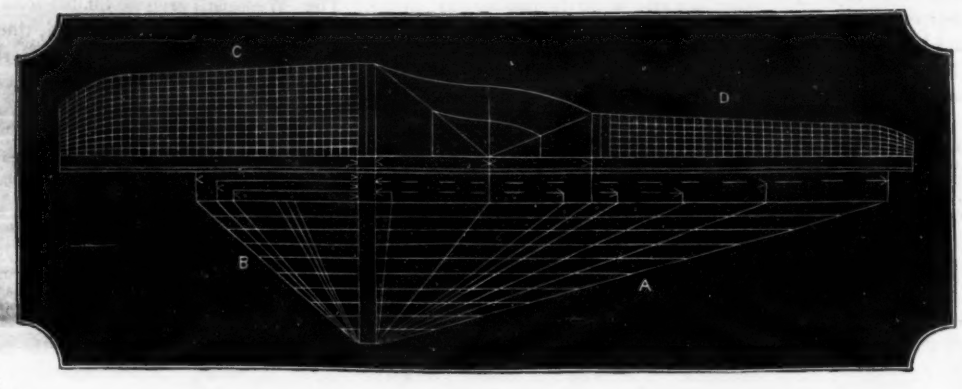


FIG. 12.

Fig. 16 is an illustration of my method of knowing if a pair of gears will work together without making templates, for that purpose.

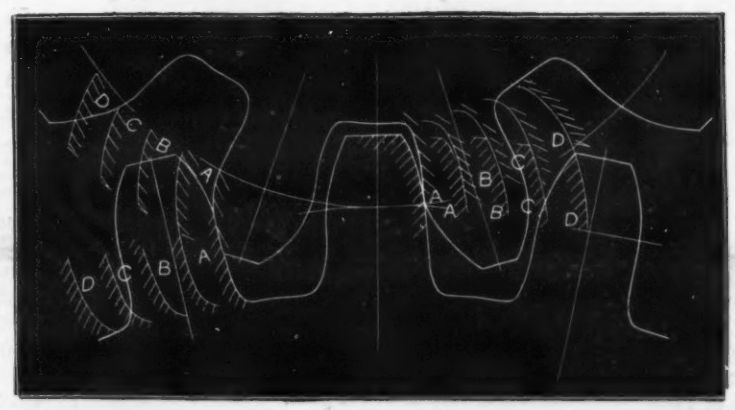


FIG. 16.

All gears (irrespective of their diameter) working together make the same feet per minute on their pitch lines; hence if we set off A, B, C, D, as in Fig. 16, any equal distance apart on pitch circle of both gears, then with radii for faces and flanks of both gears describe arcs from *A*, B, C, D, always keeping one end of dividers on the "path of centers," belonging to that part of the teeth being described. The lines thus described will show the relative position of the teeth at various positions of the gears.

Contracts and Construction.

A NEW rolling mill at Chartiers, Pa., is rumored.

SPRINGFIELD, O., water mains are to be extended.

JACOB SNYDER, Akron, O., has the contract for plans for a $20,000 Methodist Episcopal church at Greenville, Pa., and for a church at Camden, N. J.

WEBB'S Opera House, Warren, O., is to be entirely remodeled.

BUILDINGS costing about $75,000 are to be erected by the Government at the Columbus, O., barracks.

STEAM heaters are wanted in the Hubbard, O., school building.

THE Trumbull County, O., Children's Home will probably be located at Warren.

THE latest Hall Safe & Lock Co. rumor is that their works are to be removed from Cincinnati to near Chicago.

JOHN W. BOOKWALTER, of Springfield, O., will tear down his Lagonda House and rebuild it as a first-class, modern, six-story hotel, with two elevators.

GODFREY & CLARKE, Elkhorn, Pa., will at once put up a new paper mill. It will be of iron, 75x150 feet in dimensions.

RECENT Ohio incorporations, with capital stock: Ballast Unloader Co., Toledo, $25,000; Southern Wharfboat Co., Cincinnati, $20,000; Craig Patent Rein-holder Co., Canton, $12,000.

RECENT fires: At Watertown, Wis., Kunert Bro's. machine shop; at Shelby, Mich., Pullman & Hinghman's handle factory; at Coleman, Mich., Geo. Miller's shingle mill; at Bloomington, Ill., Smith & Barnes' carriage works.

Curiosities of Mechanics.

IT is estimated that ninety thousand millions of cubic feet of water pour over Niagara every hour. Estimating the fall as 169 feet, this means about 500 million horse-power running to waste.

MESSRS. B. and S. Massey, of Manchester, Eng., have just completed for the Mersey Forge, Liverpool, an exceptionally powerful steam hammer. The total weight of the hammer without the base-plate and anvil is about 50 tons, and it has a falling weight of nearly 11 tons. It is of the bow form, and measures 18 feet between the standards. The cylinders have a 34 in. bore, and the piston a stroke of 7 ft.

THE steam fire engines of the city of Berlin, have pipes for the discharge of compressd carbonic acid into the steam chamber. When the engine starts from the station the boiler is heated; on arriving at the fire the carbonic acid is at first employed as a motor, then the gas and steam work together, and finally steam alone is used. By this arrangement the engine is brought into action four or five minutes soouer than would be otherwise possible.

Market Review.

OFFICE OF TRADE REVIEW AND WESTERN MACHINIST.
CLEVELAND, FRIDAY EVENING, October 26, 1883.

IRON ORE.

The present tone of the market can best be reflected perhaps, by the following portion of a letter from a consumer: "At present we have all the ore we can handle and would not feel inclined to place our orders for anything until we can see a revival of trade." Furnace men are still maintaining the above policy, buying only for actual wants, and we continue to hear of some furnaces blowing out; but while this is true, the tendency of trade appears to be more and more in the direction of better business and higher prices before the winter is over. A well-informed ore man stated that stocks of iron west of the mountains are not large, those in consumers' hands being "nothing" and those in producers' hands less than last Spring. Trade is fairly steady at present prices, though the week's business has not shown any large transactions. It begins to look as if, with the restricted production this year, the docks will be pretty well cleaned up by the opening of navigation next year. As far as we can judge, the good low-priced ores are about sold up, and not much of No. 1 left. The consumption promises to be large during the Winter, and by Spring there will be a sharp demand for any unsold ores. We know of several large concerns, that have supplies only through February, and with ordinary demand will then have to buy. Shipments from Lake Superior ports up to and including October 17 were 1,932,891 tons, a decrease of 524,663 tons from last year up to the same time. Lake freights continue firm at $1.45 from Escanaba and $1.75 from Marquette to Lake Erie ports. The effect of the failure of a leading ore dealer the past week will not be materially felt upon the market, as the causes leading thereto are remote and relate chiefly to transactions between him and the company he represented. There have been receivd at this port the past week 12,206 tons; shipped, 28,905 tons We quote:

No. 1 Specular and magnetic Bessemer Ores per ton	$7.00@ 7.50
No. 1 Specular (non-Bessemer) ores per ton	5.50@ 6.50
Bessemer Hematites	5.00@ 5.25
Non Bessemer Hematites	4.75@ 5.00
Menominee Range Bessemer	6.25@ 6.75
Menominee Range non-Bessemer	4.75@ 5.00

Receipts and shipments of ore at Cleveland each day the past week have been as follows:

Date.	Receipts (tons).		Shipments (tons).	
Oct. 18	....	"	2,371	"
" 19	49	"	12,498	"
" 20-21	4,256	"	3,680	"
" 22	....	"	6,376	"
" 23	7,889	"	1,021	"
" 24	12	"	3,319	"
Total	12,206	"	28,505	"
Last week	30,243	"	10,780	"

IRON ORE RECEIPTS AT LAKE ERIE PORTS

AT FAIRPORT.

[Specially reported for the TRADE REVIEW.

FAIRPORT, O., 25.—For the week ending October 24 the receipts of ore at this port were 4,730 tons.

LORAIN.

[Specially reported for the TRADE REVIEW.

LORAIN, O., Oct. 20.—The receipts of ore at this port for the past week have been 2,500 tons; shipments, 500 tons. It has been rather a dull week in the vessel business.

PIG IRON.

There has been a fair volume of business the past week, but the range of transactions has not been large. There is a good demand for good brands of Foundry and Mill, and there is no excess of best irons. The greatest trouble is the want of confidence. The low price of ore and coke has enabled furnace men to sell for at least some profit, while the fact that prices are now believed to be at bed-rock gives ground for the prediction that the next turn will be upward. "Any change must be for the better," is the general talk. Certainly there is no cause for alarm, since the situation is not to be compared with that of 1877 and 1878, business being much more on a cash basis now than then. Advices from the Shenango and Mahoning valleys are that most of the furnaces are working on contracts, and that there is little or no accumulation of stocks. The situation at Pittsburgh furnaces is substantially the same. In the East the Thomas Iron Co. has made another drop of 50 cents per ton and blown out three of its furnaces.

CHARCOAL PIG IRON.

No. 1 Lake Superior charcoal	$23.00@25.00
No. 2 Lake Superior charcoal	23.00@25.00
Nos. 3 and 4 Lake Superior	24.00@27.00
Nos. 5 and 6 Lake Superior	23.00@25.00
Nos. 1, 2, 3, 4, 5, Salisbury	35.00@37.00
Southern Car Wheel	28.00@33.00

BITUMINOUS AND COKE IRON.

No. 1 foundry, all lake ores	$21.50@22.50
No. 2 same	20.00@21.00
No. 1 foundry, lake ores, with cinder mixture	20.50@21.50
No. 2 same	19.50@20.50
No. 1 foundry, native Ohio ores	21.00@22.00
No. 2 same	19.00@20.50
No. 1 silvery, native Ohio ores	21.00@22.00
No. 2 same	18.00@20.00
No. 1 gray forge, red short	19.00@20.00
No 1 gray forge, neutral	18.00@19.00
No. 1 Bessemer	22.00@23.00
No. 1 "Arnold" American Scotch	24.00
No. 2 " " "	23.00

Receipts and shipments of pig iron at Cleveland each day the past week have been as follows:

Date.	Receipts, tons.		Shipments, tons.	
Oct. 18	136	"	16	"
" 19	85	"	117	"
" 20-21	359	"	..	"
" 22	4,491	"	121	"
" 23	318	"	114	"
" 24	144	"	72	"
Total	5,563	"	440	"

MANUFACTURED IRON.

We have to report a moderate demand for manufactured iron this week, sheet and plate iron being more particularly sought after. Sales of bar iron continue to be in small quantities, yet dealers have no special reason to complain of the situation. Most of the mills are running steadily, though not all full force. Manufacturers are generally in a better condition now than they were a year ago in this locality. One feature of trade deserving notice is the steady increase in the demand for steel plate and the consequent displacement of iron plate in the market.

Receipts of bar iron in Cleveland the past week were 1,266 tons; shipments 1,451tons:

STEEL RAILS—Orders are coming in slowly, and mills are running only on limited time. The Iron Age hears of an order of 2,000 tons placed with a Western mill for Spring delivery, at $40.50.

Shipments of steel rails in Cleveland the past week were 882 tons; iron rails, 1,655 tons.

HARDWARE.

Trade continues fair, tinners' Fall goods moving off most actively. Russia iron is yet in scarce supply. Collections are a little harder to make. The Western Shovel-makers' Association met recently in St. Louis but made no material change in the list. The manufacturers of lawn-mowers met in New York recently and decided to leave the discount of 1883 unchanged. The window glass strike is still on, and stocks are much broken. We lower prices on annealed and barbed wire.

NAILS—Nails are in good demand and supply, though 5c. lower, in sympathy with the iron market. We now quote them at $2.75 for carload lots. The Western Nail Association met at Pittsburgh Wednesday and decided, contrary to expectations, not to shut down for four weeks but to defer action until the November meeting. Stocks were reported moderate and assortments badly broken. The Atlantic States Nail Association is now working in concert with the Western Association, having adopted a pledge at its last meeting not to sell any nails west of the Allegehenies during the stoppage of the Western factories. Cleveland receipts the past week were 7,151 kegs; shipments 5,546 kegs.

COAL.

The utmost activity has characterized the market during the past week. The market is short of large sizes of coal. Prices are stiffening considerably. Freights still have an upward tendency, $1.00a1.15 to Chicago and Milwaukee being asked and obtained, and tonnage scarce at that. The local anthracite market is in good condition. The Coal Trade Journal puts the anthracite production up to October 1 at 23,035,519 tons as against 20,778,246 tons last year.

Receipts and shipments of coal at Cleveland each day the past week have been as follows:

Date	Receipts tons). Anthracite.	Bituminous	Shipments (tons). Anthracite.	Bituminous.
Oct. 18	192	4,240	..	4,382
" 19	52	8,055	111	1,555
" 20-21	166	10,151	24	1,650
" 22	161	5,666	..	1,351
" 23	135	7,554	60	..
" 24	192	7,726	11	3,150
Total	998	43,392	206	12,268

AT OTHER PORTS.

CHICAGO.

Specially reported for the TRADE REVIEW.

CHICAGO, Oct. 24.—The total receipts of anthracite from May 1 to October 1 were 701,917 tons; bituminous, 1,125,795 tons. The total receipts of all kinds of coal, including coke, were 1,827,712 tons.

LORAIN.

Specially reported for the TRADE REVIEW.

LORAIN, O., Oct. 20.—Receipts of bituminous coal at this port the past week have been 500 tons.

COKE—Local receipts of coke the past week have been 2,006 tons. The Coal Trade Journal denies by authority the report that the coke men intend to advance the price 30 cents per ton January 1.

METALS.

The local market is very quiet, although prices remain quite firm.

MACHINERY OILS.

The demand for seasonable oils is good, with firmer prices for them, as well as animal and marine oils, without any material change in prices.

LOUISVILLE PIG IRON MARKET.

Reported for the TRADE REVIEW by Geo. H. Hull & Co.

There is no animation in the pig iron market. The amount being consumed is large and manufacturers are buying to cover their wants, which in the aggregate creates a very satisfactory business as to quantity, but prices continue very low:

FOUNDRY IRON.—Hanging Rock Charcoal, No. 1, $23.50@$24.50; Southern Charcoal, No. 1, $21.50@$22.00; Hanging Rock Stone-coal and Coke, No. 1, $19.50@$20.50; Southern Stone-coal and Coke, No. 1, $19.00@$20.00; Southern Stone-coal and Coke, No. 2, $18.50@$19.00; "American Scotch," $18.00@$19.00; Open Silver Gray, $17.50@$18.00; Close Silver Gray, $16.50@$17.00. MILL-IRONS.—No. 1, Charcoal, $19.00@$20 00; No. 1, Stone coal and Coke, Neutral, $17.90@$17.50; No. 2, Stone-coal and Coke, Neutral, $16.50@$17.00; No. 1, Stone-coal and Coke, Cold Short, $16.50@$17.00; No. 2, Stone-coal and Coke, Cold Short, $16.00@$16.50; White and Mottled, Cold Short and Neutral, $15.00@$15.50. CAR-WHEEL IRONS.—Hanging Rock, Cold Blast, $30.00@$31.00; Hanging Rock, Warm Blast, $23.00@$24.00; Alabama and Georgia, Warm and Cold Blast, $27.00@$28.00; Central Kentucky, Cold Blast, $26.50@$27.00.

CINCINNATI PIG IRON MARKET.

[Reported for the TRADE REVIEW by Rogers, Brown & Co.]

The Hanging Rock failures are the principal features of the week, in the pig iron market. What the effect will be upon demand and prices cannot be foreseen. However, the entire product of all the furnaces interested would not equal that of a large Southern coke furnace. There is some iron at the Campbell furnaces which if forced to sale, will compel other charcoal producers to stand aside until it is out of the way. In coke irons there is no change. Some large consumers are in the field with offers a dollar below the market for big lots, spot cash and early delivery, but these find no takers. Southern foundry iron is taken as fast as made and at full market prices. In mill iron the furnaces are, as a rule, sold far ahead. It is estimated that the leading Alabama and Tennessee producers have sold in the aggregate 30,000 tons ahead of make. Foundry business continues good, the stove makers being especially active. The mills have work enough but complain sorely of prices. Most of the car wheel works are full of orders and using heavily of iron. We revise our quotations which are for cash:

Hot Blast Foundry.—Hanging Rock Charcoal, No. 1, $22 50@$23 50; Hanging Rock Charcoal, No. 2, $20 00@$22 00; Southern Charcoal, No. 1, $21 50@$22 50; Strong Coke, No. 1, $19 50@$20 50; Strong Coke, No. 2, $18 50@$19 00; Strong Coke, No. 3, $18 00@$18 50; Soft Stone Coal, No. 1, $19 50@$20 50; Soft Stone Coal, No. 2, $18 00@$19 00. Forge—Strong Neutral No. 1 mill $17 00@$17 50; Cold Short No 1 mill, $16 00@$16 50. Car Wheel & Malleable—Hanging Rock Cold Blast, $30 00@$31 00; Hanging Rock Warm Blast, $24 00@$26 00; Southern Car Wheel Iron, $25 50@$26 50; Lake Superior Car Wheel Iron, $24 50@$25 50; Lake Superior Malleable Iron, $24 50@$25 50.

[Reported for the TRADE REVIEW by E. L. Harper & Co.]

Notwithstanding the financial misfortunes that have overtaken some of the furnaces, and the much talked-of "dullness," the market is well sustained and prices rule quite firm. There is no superfluity of standard grades of coke foundry and Mill Irons, amd the trade is beginning to realize it. We quote as prices current:

FOUNDRY.—Hanging Rock Charcoal, No 1, $23 25@$24 25; Hanging Rock Charcoal, No. 2, $22 25@$23 25; Strong Neutral Coke, No. 1, $19 50@$20 50; Strong Neutral Coke, No. 2, $18 00@$19 00; American Scotch, No. 1, $18 50@$19 50. GREY FORGE.—Neutral Coke, $17 00@$17 50; Cold Short, $16 50@$17 00. CAR WHEEL AND MALLEABLE—Hanging Rock, Strictly Cold Blast, $27 75@$28 25; Hanging Rock Warm Blast, $24 00@$24 50; Lake Superior, Charcoal all grades $26 00@27 00; Southern Car Wheel Strictly Cold Blast, $27 0 @$28 50.

LUMBER MARKET.

PLANK—MIXED WIDTHS, 1¼ AND 1½ INCH.

A 1 & 2..$50 00 A 3..$40 00 B..$32 00 C..$21 00 D..$14 00 E..12 00

2-IN. 12, 14 AND 16 ft., TOGETHER.

A 1 & 2..$48 00 A 3..$40 00 B..$32 00 C..$21 00 D..$14 00 E..13 00

BOARDS—1 IN. MIXED WIDTHS.

A 1 & 2..$45 00 A 3..$36 00 B..$29 00 C..$20 00 D..$14 00 E..11 00

STOCK BOARDS—12 IN.

A 1 & 2..$45 00 A 3..$36 00 B..$34 00 C..$20 00 D..$15 00 E..12 00

STRIPS—6 IN.

A 1 & 2..$42 00 A 3..$ ... B..$32 00 C..$20 00 D..$15 00 E..12 00

FLOORING, SIDING AND CEILING.

Matched flooring.....A 3, $42 00 B, $35 00 C, $23 00 D, 18 00
Matched drop siding, 6 in. A 3, $42 00 B, $38 00 C, $23 00 D, 18 00
¼ in. bevel siding.....A 1 & 2, $22 00 A 3, $20 00 B, 18 00
Beaded ceiling $2 higher than flooring.

BILLSTUFF.

Small joist, 12, 14 & 16 ft. $12 00 18 ft .....$12 00@$13 00 | Small timb'r, 12,14,16,18 ft 14 00 larger than 8x8, special.
Long timber, 20 ft. and over, add about $1 per ft. to the price of short.

SHINGLES, LATH AND MILL WORK.

Shingles, XXX, 18 in.....$4 10 clears or clear butts $2 50@$3 00 | Lath, Norway .....$2 50 S, 1 S, $1.00; S, 2 S .....$1 50 Matching, flooring and drop siding.....$2 00@$2 50
Lath, W. Pine $2 70

COAL deteriorates or decays to a greater or less degree by exposure to the atmosphere, by disintergration or crumbling, and also by gradual combustion of the volatizable elements. Atmospheric oxygen is absorbed, and converts the hydrocarbons into water and carbonic acid. It has been proved in one case, in Germany, that bituminous coal, after having been exposed for nine months, lost half its value as fuel; coal exposed for three months to a temperature of 284 deg. Fahr., lost all its hydrocarbons.—[Ex.

GIVE the TRADE REVIEW a trial.

Cleveland Wholesale Prices.

[The lowest quotable prices are given in all cases.]

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.. " " 19 50

Axes.

per doz.
James' 2d qual..... $7 00
Buckeye..... 7 75
" doub. bitt..... 15 00
Hunt's..... 9 50
Mami's..... 8 00
Lippincott's Crown..... 8 50
Cut More..... 9 00
Peck's Double Bit..... 22 00
"Champion Blade..... 11 00
Good triple silver steel.. 11 50

Axles.

Standard list,.....
Nos. 1 to 6, 50 & 10 off
Nos. 7 to 14, 50 & 5 off
Nos. 15 to 18, 45 off
Nos. 19 to 22, 50 & 5 off

Anvils.

per lb.
Eagle, Amer.....10c dis 20
Wright's.....11¼c@11c
Armitage's Mouse Hole.....9½c@9¾c
Trento.....10¾c
Wilkinson's.....10½c

Anvil Vise and Drill.

Millers Falls Co. $28..... dis 20
Cheney Anvil and Vise dis25&2

Augurs and Bits.

C S cut augers .....dis 50&10
do do do bits..... 50&10
D C gimlet do Ives.. dis 50
Snells bits .....dis 40&10
Russell Jennings' augers, dis 10&10&10
Cook's pat augur.....40&10

Animal Pokes.

Akron.....$ 3 50
Camp's..... 4 00
Berea, per doz..... 4 00
Eagle, per doz..... 5 00

Apple Parers.

Domestic&Reading ℔ doz.$7 00
Turn Table..... 4 50

Bolts.

Machine..... dis 70
Plow..... dis 40
Plow, R. B. & W..... dis 40
Cast Iron Barrel Shutter, etc.....dis 55&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts. dis 50
Wrought Barrel.....dis 55&10
Wrought Square ....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list .....dis 50&10
Tire, R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s..... dis 40
B. B. & W.....dis 40
Bolt Ends 16c. per lb net... 70

Bellows. Dis

Hill,s .....40 pr cent
Bl'ksmith's com new list,50℔ct
Moulder's new list, dis 25 ℔ ct
Hand, new list, 25 per cent

Butts. Dis

Wrought brass..... 70
Cast, loose joint.... 60&10
Pin, loose..... 55&10
Wrought, fast joint narrow..... 50&10
Wrought fast joint broad..... 50&10
Wrought loose joint broad ..... 55&10
Wrought table and back haps..... 50&10
Loose joint, without acorns..... 55&10
Ten per ct. extra dis for cash.

Boiler Plates.

"Gaylord"-Standard Quality.
C. No. 1.....4 50
C. H. No. 1 Sheil.....4 75
C. H. No. 1, 50,000.....5 25
C. H. No. 1, 55,000.....5 75
C. H. No. 1 Flange.....6 50
Firebox .....
T. S., 60,000 .....(as per)..6 50
T. S., 65,000 .....(act of)..
Homo. Steel, 70,000(of Cong)7 50
Heads, ¼c ℔ lb. extra.
N.B.-Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch .... dis 25
"National" Special Locomotive Tubes.....net list

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Boiler Makers' Tools.

Doty's Power Shears ..net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch .....net list
Steel Screw Punch.....net list
Iron Screw Punch ....net list
Boiler Plate Rolls.....net list
Buffalo Forges& Blowers dis 20
Watson's " " net list
Spring Tube Expander...dis 15
Roller Tube Expander..net list
National Tube Cleaner .dis 20
Wire Flue Brushes ...net list
Anvils—'PeterWright' 12½℔lb
Solid Box Vises .. net list

Cleveland Stamped Elbows

Genuine Russia Iron

4½inch, per doz..... 5 50
5 do do 7 50
6 do do 9 50
7 do do 11 00

Charcoal Iron

6½inch, per doz..... 2 50
do do 3 50
do do 4 50
do do 5 50
Planished Amer. Russia Iron
4½inch per doz..... 5 00
5 do do 6 50
6 do do 8 50
7 do do 9 50
Discount 33⅓ per cent

Chisels.

Hot and cold cutting...℔ lb 30
Railroad track 30
Machinists..... 30
Mallet head 50
Tape 50
Packing 50
Stone cutters 50

Crowbars.

Cast steel ..... ℔ lb 7
Iron,steel points..... 5c

Cutlery, Pocket and Table.

Meriden Cutlery Co , table net
Am. Miller Bros.' Cutlery Co .....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co list net
Aaron Berkenshaw's pocket dis 25
Fram Cutlery Co., . table net
Cleveland Cutlery Co...dis 25
Miller Bros., pocket.... 33⅓
Akron Cutlery Co.....dss 45

Coopers' Tools.

Bradley's ..... dis15@20
Braton's ... . dis15@20

Chains.

Coil by cask.....

3-16	¼	5-16	⅜	7-16	½
10¾	9	8	7	6¾	6¼

Drills and Drill Stocks.

Blacksmiths', each $2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ...dis 20&10

Drawing Knives.

Peck, Stow & Wilcox.... dis 70
Witherby's .....dis 65@10
Nobles Mfgr. Co 15
Adjustable handle 20

Emery and Sand Paper.

Regular Numbers .....℔ lb 6c
Flour and F. F.....℔ lb 4c
B. & A. Emery Paper ...dis 35
Sand paper .....dis 35

Enameled & Tinned Ware.

Kettles .....dis 50
Sauce Pans.....dis 30
Tinned Sauce Pans..... dis 30

Files.

Parkin's $5 to £ . dis 45 ℔ cent
E.M. Boynton's, new list dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro. .....dis 50
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond"..... 4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble..... 4.50 to £.
H. Disston & Sons (new list)..... dis 40 per cent
Heller Bros.' Horse Rasps .....dis 35
Nicholson..... dis 40
New American..... dis 40
Union File Co..... dis 40

Grindstones.

Berea.....1@1¼℔ lb
Ohio.....1¼@1⅞ ℔lb
Nova Scotia.....1¼@1¾ ℔lb
Lake Huron .....1@1¼℔ lb

Hammers.

Maydole's .....dis 15
Cheney's .....dis 25
Hartford Hammer Co.....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75,dis25&10
Nelson Tool Works...dis 40&10
Warner & Noble's .....dis 5
Kip's.....dis 15

Hatchets.

Buckeye.....Shingling,
Nos...1, 2, 3,
℔ doz $7 50,$8 00,$8 50,dis 40
Claw,
Nos...1, 2, 3,
℔ doz$8 25,$8 75,$9 25, dis 40
Lathing,
Nos.....1, 2, 3,
℔doz $7 50.$8 00,$8 50, dis 40

Hinges.

Champion double acting spring hinges .....dis. 30
Screw & Strap 8@12in. ..$5. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10
Clark & Co ..... 70&10

Locks.

Whippe Mfg Co ..... 50 &10
Norwalk Lo Co .....45&10&10

Nails.

20 to 60d $2 75
8 and 9d 25
6 and 7d..... 50
4 and 5d..... 75
3d 1 50
2d 2 75
3d fine 3 00
2d fine 3 75
¾ inch 3 00
4d barrel 1 00
1¼ inch barrel nails..... 1 50
1½ do do do 1 75
1 do do do 2 50
¾ do do do 3 00
Cut spikes, all sizes..... 35
Clinch nails, all sizes..... 1 75
Casing and box nails..... 75
Finishing nails, ... $1 25
Tobacco nails, ... 50

Nuts and Washers

Nuts, square..... 8c off list.
Nuts, hexagon.....9c. off list.
Washers.....7c off list.

Nuts, Bolts, etc.

Machine Bolts .....dis 70
Bolt Ends .....dis 70
Boiler Patch Bolts.....net list

Picks.

Railroad, 4 to 5 lbs.. doz $6 60
5 to 6 lbs.. 7 20
to 7 lbs.. 7 80
7 to 8 lbs.. 8 40
Railroad Tamping Pick.. 7 to 8 lbs..doz 10 80
Mill Picks per lb..... 75c

Planes.

Ohio Tool Co .....dis 20
Sciota .....dis 25
Bailey's Pat. Adjustbledis 20@10
Sandusky, fancy .....dis 15
Buckeye .....dis 20
Ogontz .....dis 25

Rivets.

Iron .....dis 40
Tinned.....dis 40
Copper .....dis 50

Rules.

Stanley..... ....dis. 70 & 1

Squares. D..s

Steel or iron, case lots.....50
Try squares and T bevels....40

Spikes—WROUGHT

All lengths by ¼ inch .....4 c
do do do 5-16 ..... 8¼
do do do ⅜, 7-16 & ½in 8

Shovels and Spades.

Ames' new list, July 1, 1881, ...dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Bishop .....dis 50
Chisholm.....dis 25@30
Rowland's .....dis 50
Griffiths .....dis 50

Sad Irons.

From 4 to 10 lbs... per lb 3 net
Self-Heating.....℔ doz $9 net
Tailors..℔ doz $18 net
Gleason's Shield and Toilet .....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott'sIrons, square back.....dis 35
Enterprise Star Irons....dis 35
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Saws.

Disston.....dis 20
Disston's Circular .....dis 40
Disston's hand panel, rip, &c.....dis 20
Boynton's lightning cross cut new list .....dis 40
Boynton's circular and mill.....dis 40
Boynton's ice .....dis 25
Boynton's lightning hand panel and rip .....dis 25
Livingston's butcher and kitchen .....dis 20
Livingston's framed wood Nos. 101 102 103 104 105 doz $10 8 50 10 7.50 6 20 net
Peace circular & mill...dis 40
Peace hand panel and rip .....dis 25
Peace band saws, all widths.....dis 10

Scales.

Hatch, Counter, No. 171 ℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks' .....dis 20
Buffalo Scale Co.....dis 40
Forsyth,Scale Co.....dis 25
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓&10

Screws. Dis

Flat head iron or steel [new list] per cent dis. 55
Flat head brass 55
Round head iron or steel 50
Round head brass..... 45
Brass and Silver capped. 30
Japanned, list of Plain Screws..... 40
Coach, patent Gimlet point, list per 100 65
Lag, taper points..... 70
Bed 10
Machine, flat head, iron. 55
round head, iron 50
Bench, iron..... 55&10
wood, beech, per doz $3 10
wood, hickory .....20&10

Tinners' Tools & Machines.

Machines(P.S.&W.) ... less 10
Tools (P. S. & W.) ..... " 20

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe dis 70&10
Malleable Iron Fittings... 20
Grey Iron Fittings ....dis 50
Steam Brass Goods.....dis 55
Water " " .....dis 50
Ludlow Gate Valves ...dis. 20
Register Gauge Cocks net 1 00
Montg'ry Gauge Cocks $1 each
Steam Gauges.....dis. 40
Steam Guages 5 in. net dial per doz.....30 00
Scotch Glass Tubes.....dis. 70
Tools.....special.
Duplex Injectors.....net.
Soil Pipe & Fittings,Mott's List.....dis. 30
Sinks, Mott's List.....dis. 25
Copper Bath tubs, sinks, etc.....dis. 25
Galvanized Iron Boilers "Scaifes."....dis. 50
Marble Slabs, Counter-sunk net per ft.....$ 1 25

Sheet and Tank Rivets.

"Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany."

⅛,¾,11-16, and ½ in. diam .5 00

Valves. Dis.

Jenkins' Patent Gate Valves.35
" " Globe ..40
" Standard Packing " .20

Vises.

Solid Box, list of July 1, '79, ...dis 45
Solid "Crown" (A. H. Hillick).....40 to 100 lb, 15c net
Solid, Peter Wright's.....15½
Solid, Wilkinson's.....13½
Parallel, Parker's.....dis 40
" Simpson .....dis 20
" Prentiss.....dis 15
Saw Filers, Hopkins' ℔ doz $17.50, dis 10
" Wentworth's .. 9 00
Reading.....dis 45&10
Lowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Wrenches.

Coe's genuine..... 50
Girard Standard....dis 50 & 10
Mechanics' 10 and 10....dis. 50
P. S. & W. Mechanics dis 50&10
Agricultural.....dis 70

Wire.

Brass and Copper.....dis 30
Bright & annealed, Nos. 0 @ 18 dis 60@62½
" " Nos. 19 @ 26 dis 65
" Nos. 27 @ 36 dis 70
Coppered Nos.0@18, dis 55@60
Galvanized, Nos. @18,market list, ... dis 45@50
Tinned, Nos. 0 @ 18,dis 45@47½
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18 @ 25.....dis 55
Annealed Fence, Nos. 8 and 9. ..... dis 60&5
Annealed Grape, Nos. 10 to 14..... dis 60&5
Galvanized Telegraph, Nos. 7 to 9 ..... ℔ 1
Galvanized Telegraph, Nos 10 to 11 ..... ℔ lb 8¼c
Galvanized Telegraph, No. 12 ..... ℔ lb 10¼c
Fence staples. ℔ lb 5½@5¾c
Fence Staples, galvanized, ℔lb 6½@6¾c
Stubs Steel Wire $6 00 to dis 30
Barb Wire, painted 5½c
Barb Wire, galvanized .. 6½c
Crucible Steel Ropes from ½ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at 33c

TINNER'S STOCK.

Tin.

Banca,.....per lb. 23½
Straits..... " 22½c
English..... " 22½c
Bar..... " 23½c

Tin Plate.

IC 12x12 charcoal.....$ 6 75
IC 14x20 do 6 50
IX14x20 do 8 25
DC 12¼x17 do 7 00
DX 12¼x17 do 9 00
DXX, 12¼x17 do 11 00
DXXX, 12¼x17 do..... 13 00
IC, 20x28 do 13 75
IX, 20x28 do 17 25
IC, 14x20, Best Roof.... 5 75
IX, 14x20, do 7 50
IC, 20x28 do 12 50
IX, 20x28 do 15 50
IC, 10x14 Best Coke..... 5 90
Subject to card discount.

Solder.

Half and Half, in bars....14½
No. 1 do 13½
Spelter Solder.....25

Pat Planished Sheet Iron

[A] ..... per lb 10½c
[B] ..... " 9c

Nos	10 to 14	15 to 20	21 to 24 & 26
Com	3-10	3-30	3-40 3-75
Char	5-60	5-60	6-00 6-20

Sheets over 28 in. wide ¼c extra.

Zinc.

Sheet, cask..... 6½c
Sheet, open..... 6¾c

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Bra.

All Nos not thinner than No No 28,wider than 2 in.not wider than 14 inch 30c
All Nos to No. 28 inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos to No. 28, inclusive, and widths over 20 to 30 in. inclusive 38
½c per lb advance on each No above Nos 28 to 38, inclusive.
All Brass thinner than No.8 is Platers' Brass at 53c
Sheets 24x48,and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c pr lb. more than High Brass
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars 48c
Sawed 51c
Planed or Polished ..54c

For Slitting.

Metal in width in. to ½ in. to No. 28, inclusive, 1c per lb., advance.
Metal, in width 2 in. to 1 in. thinner than No 28,2c per lb advance
Metal, in width ½ in to ¼ in thinner than No 28, 5cper lb advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths add 7c per pound.

COPPER.

Lake Ingot.....15¼@16c
Baltimor ..... 14¾@15
Arizona ..... 15@15

Sheathing Brazier Copper, Bolts, etc.
All sizes, 16 oz. per sq. foot, and over, per lb 25c
nd over per lb.....25c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 25c
Brazier's Copper, 10 oz and 12 oz. per sq. ft...per lb. 27c
Brazier's Copper lighter than 10 oz. per sq. ft...per lb 34c
Circles less than 84 inches in diameter ... per lb. 33c
Circles 84 inches in diameter and over .....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz. per sq. ft.... per lb. 24c
Bolt Copper.....per lb. 28c
Copper Bottoms per lb. 28c
No copper is Sheathing except 14x10 inches,and not to exceed 34 oz. to the sq. ft.

Tinning.

14x48 ..... per sheet 6c
All other size sheets,2½c per square foot. For tinning both sides,double the above amot.

LEAD.

Americ'n, ℔ lb..... 4¾c
Bar, ℔lb 5½c
Pipe, ℔lb 6¾c dis 10 per ct
Sheet, ℔ lb 7¼c dis 10 per ct
Tin-lined pipe 15c dis 10 per ct
Block ..... 45c.
Chilled Shot..... 8c

Babbitt Metal.

Babbit Metal, No. 3. 14 X.. 42
Pabbit Metal, No. 2, 16 XX. 46
Babbit Metal, No. 1, 18 XXX. 50
Babbit Metal, C..... 20
Babbit Metal, B..... 24
Babbit Metal, A..... 32
Dis 40 per cent.

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch..... 1 80
4½ to 6 by ⅜ to 1 inch..... 2 00
1¾ to 6 by 1¼ to 1½ inch 2 30
1¼ &1¾ by ⅜ to ¾ 2 00
1 & 1¼ by ⅜ to ¾..... 2 10
⅛ ¼ and ⅜ by .⅜ to ½... 2 30

Round

1 to 1¾ inch 1 80
2 to 2¾ 2 10
2¾ to 3¼ 2 40
3¾ to 4 ..... 2 90
4¼ to 4½ 3 40
4¾ to 5 ..... 3 60

Square.

1 to 1¾ inch 1 80
2 to 2¾ 2 10
2¾ to 3¼ 2 40
⅜ to 4 ..... 2 90
3¾ to ⅞ 2 00

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch 2 10
1 to 1¾ by ¼ and 5-16 do 2 20
¾ to ⅞ by ¼ and 5-16 do 2 40
⅜ to ¾ by ¼ and 5-16 do 2 80

Half Oval and Half Round.

Wagon box iron ¾ and ⅞ 3 50
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ¼ to 3-16..... 2 70

Hoops.

1¼ to 2 , Nos 16 to 18..... 3 10
1¼ to 4 do 13 to 15..... 3 00
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24..... 3 50
No 25 to 26..... 3 70
No 27..... 3 90
No 28..... 4 30

English Steel.

Best cast ..... ℔ lb 16c
Extra cast..... 16½c
Round machinery.. 10c
Swaged, cast..... 18c
Best double shear ... 15½c
Blister, 1st quality... 13c
Refined tool steel.... 16½c
Spring calking ..... 7¼@7½c
German steel, best .. 11c
2d quality 10c
3d quality 9c
Sheet cast steel, 1st quality 15½c
2d quality 14½c
3d quality 12½c

American Steel.

Best brands of refined cast steel, ⅜ to 2 inches..12c
Crucible cast 7c
Open-hearth ditto ... 4½c
Hammer cast steel ... 9c
Spring cast steel..... ¾c
Bessemer and open-hearth spring..... ½c
Ditto plow..... ⅜c
Steel boiler plate .... 6½@7c
Bessemer machinery 5 @5c
Spring and calking ...7¼@7c
Tire 4
Sleigh shoe..... 4

Bessemer Steel Tire.

¾ to 1 by 3-32 ..... 4 ℔ lb
¾ to 1 by ⅛ to 5-32 ... 4 ℔ lb
¾ to 1 by 3-16 to ¼ .... 4 ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit..... 10
Axle steel for wagons.....7
Frog points and plates.....8
Frog size bars 8
Pick, hammered..... 10½
Mattock, beveled.....9
Table cutlery 7½
Trap spring steel..... 10
Pike and cant hook..... 8½
Coal and granite.....

SCRAP IRON AND OLD METAL.

DEALER'S BUYING PRICES

	Per Ton
No. 1 R R wro't scrap.....	$20
No. 1 wrought scrap.....	19
No. 1 Machine cast scrap.	14
Stove plate (free from burnt iron).....	11 00
Grate bars	7
Pipes and flues (clean)....	15
Tank iron.....	14
Hoop and band iron.....	10
Light sheet iron.....	9
Axle turnings.....15 00@16 00	
Wro't turning (f from cast)	13
Wro't iron, oily drillings 9@10	
Cast borings..... 9 00	
Malleable iron.....	9
Uncut wro't iron boilers..	19
Old copper per lb.....	15
No. 1 H. Brass per lb.....	11
Heavy yellow Brass do.. 9@11	
Light Brass per lb.....	7@9
Scrap Zinc per lb.....	2@3
Tea Lead per lb	3
Heavy Lead per lb	4

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe

Inside Diameter of Pipes.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛..	08		.40	24
¼..	08	$0 11	.54	.42
⅜..	09	12	.67	.56
½..	11	15	.84	.85
¾..	13½	19	1.05	1.13
1 ..	19	25	1.31	1.67
1¼..	27	40	1.66	2.26
1½..	33	47	1.90	2.69
2 ..	46	64	2.37	3.66
2½..	75	1 00	2.87	5.77
3 ..	95	1 30	3.50	7.55
3½..	1 25	1 70	4 00	9 05
4 ..	1 50	2 05	4.50	10.73
4½..	1 75	2 40	5.00	12 49
5 ..	2 25	3 00	5.56	14.56
6 ..	2 75	4 00	6.62	18.76
7 ..	3 75	....	7.62	23.00
8 ..	4 75	....	8.62	28.00
9 ..	6 50	....	9 68	34.46
10 ..	8 00	....	10.75	40.64
12 ..	12 00	....		54.65

Discount, car load lots,] 70 and 10 per cent. Less than car load 70 to 70&5.

COAL,

WHOLESALE.

Wholesale f.o.b. cars at Cleveland:

Carbon Hill and Monday Creek	$2 50
Massillon	2 70@3 00
Palmyra, lump	3 25
Brier Hill	3 25@3 50
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 40
New Hazelton	2 50
New Hazelton, mix	1 20
" " nut	2 00
Connotton	2 25
Connotton, mix	1 20
" nut	2 00
Anthracite grate	5 40
Anthracite egg	5 58
Anthracite stove	5 85
Anthracite chestnut	5 98

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 50
Carbon Hill and Monday Creek, nut	3 25
Straitsville, lump	3 75
Straitsville, nut	3 50
Palmyra, lump	4 25
New Hazelton	3 50
Connotton	3 00

75c less on cars by car load.
Anthracite Stove and Chestnut 6 75
Egg and grate 6 50

OILS.

Pure Oils. p'kages included	
Sperm, winter bleached per gal.....	1 28@1 33
Whale, winter bleached per gal.....	66@68
Straits.....	50@53
Bank.....	48@50
Lard oil extra W S..	66@69
do No 1 do.....	55@58
do No 2 do.....	50@53
Tallow oil.....	67@70
Neatsfoot oil pure..	95@$100
do No 1	80@85
Linseed oil, raw	57@60
do do boiled	60@63
Cotton seed oil white	53@55
do do yellow	52@54
West Virginia lubricating 28 deg.....	15c@20c
Paraffine oil winter pressed.....	22@25
Capitol Cylinder.....	85
Model do	65
Eldorado Engine..	
Turpentine, per gal..	

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15.....	8 00
11x14 to 15x24.....	9 00
16x24 to 20x28.....	10 25
15x34 to 24x30.....	11 25
26x28 to 24x36.....	12 00
26x36 to 26x44	13 50
26x46 to 30x50.....	14 58

DOUBLE THICKNESS Dis60&20

6x8 to 10x15.....	12 25
11x14 to 15x24.....	13 75
16x24 to 20x28.....	16 25
15x34 to 24x30.....	17 75
26x28 to 24x36.....	19 00
26x36 to 26x44.....	20 75

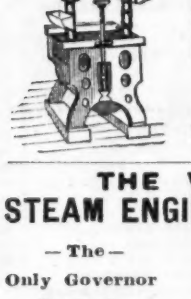
Dis. 70

The Basic Process in Europe.

From the Bulletin du Comite des Forges de France, we take the following statistics of the production of steel by the basic process, during the first six months of the present year:

	No. of converters.	Product. Tons
England	4	57,900
France	2	5,900
Belgium	1	12,786
Germany	9	152,479
Austria	3	37,476
Russia	1	12,786
Total	17	279,387

In 1882, 6½ million tons of ingots were produced in the whole manufacturing world. As will be seen from the above figures, this process has met with the greatest favor in Austria and Germany; in the former country it produces 28 per cent. of the steel made, and in the latter 25 per cent., while it is only adopted to the extent of 5 per cent. in England.



Anti-Friction,

Roller Detachable

Chain Belting.

FOR

Elevators, Conveyors, Carriers, etc., and for Driving Purposes.

Recommended as a superior chain belting having greater wearing surface, and in connection with the Friction Roller, longer lived, than any similar belting.

Manufactured and sold by the

Lechner Mfg. Co.,

COLUMBUS, O.

Send for Catalogue and price list. 24

THE WATERS STEAM ENGINE GOVERNOR.

— The —
Only Governor Perfectly Suited to every Variety of Stationary and Portable Steam Engines.

Warranted suit or no sale.

Manufactur by

Edward Dewey & Co.,

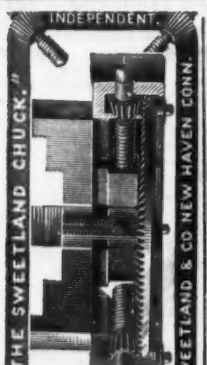
34 OLIVER STREET, BOSTON, MASS.

Send for Circulars 48

ECLIPSE ELECTROTYPE AND ENGRAVING CO.

147 ST. CLAIR ST.

CHAS. W. DEAN — CLEVELAND, OHIO.



PECK'S PAT. DROP PRESS

CAST FORGES.

STEEL & IRON DROP FORGINGS.

Drop Dies and Special Machinery.

BEECHER & PECK, NEW HAVEN CONN.

DEAD-STROKE

Power Hammers.

Construction Improved. Seven Sizes. 5 to 250 Pounds. Over 600 in Use. Price reduced March 1st.

The 15 and 25 pound sizes are specially adapted for Filemakers' use, the other sizes for general forging. Send for circular and references.

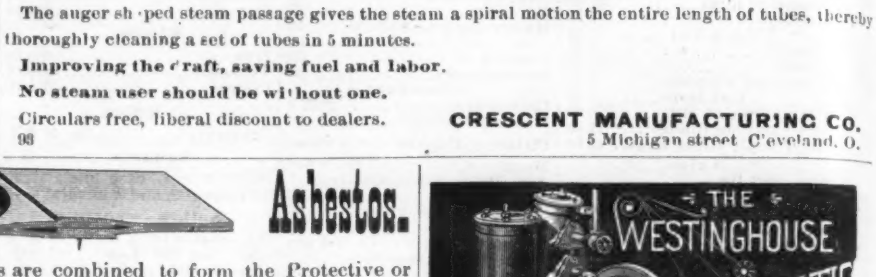
DIENELT & EISENHARDT,

MAKERS,

1306 Howard Street, Philadelphia.

The Cyclone Boiler Flue Cleaner,

Gerlach's pat. June 5, 1883.



The auger shaped steam passage gives the steam a spiral motion the entire length of tubes, thereby thoroughly cleaning a set of tubes in 5 minutes.

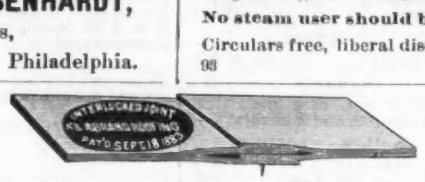
Improving the draft, saving fuel and labor.

No steam user should be without one.

Circulars free, liberal discount to dealers. 98

CRESCENT MANUFACTURING CO.

5 Michigan street Cleveland, O.

Asphalt and  **Asbestos.**

Manufacturers of
Roofing Felt,
Slaters' Felt,
Roofing Pitch,
Roofing Paint,
For Tin and Iron Roofs.
Asphalt,
Asbestos and
Black Varnish, etc.

These Minerals are combined to form the Protective or Surface Coating for our **"A. & A." Brand Patent Interlocked Ready Roofing.** The only way of making a perfectly water-tight joint in Ready Roofing. We have the references that will convince you that this Roofing is DURABLE, FIRE, WATER and ACID PROOF. Easily applied; one-third the cost of tin. A trial order at very low price. Circulars and Samples free.

Cincinnati Roofing Co.,

CINCINNATI, OHIO. 24

Cleveland Foundry.

CASTINGS

For Machinery and Rolling Mills.

Car Wheels

all sizes and kinds, with and without Axles.

Chilled Faced R. R. Frogs.

STREET RAILROAD TURNOUT.

Nos. 9, 11, and 13 Winter Street.

BOWLER & CO.

NEW OTTO SILENT GAS ENGINE.

Working without Boiler, Steam, Coal, Ashes or Attendance.

Started instantly by a Match, it gives full power immediately. When stopped all expense ceases.

No explosions; no fires nor cinders; no gauges; no pumps; no engineer or other attendant while running 01

Unsurpassed in every respect for hoisting in warehouses, printing, ventilating, running small shops, &c., 2, 4 and 7 H P. and upwards. Built by **Schleicher, Schumm & Co.,** PHILADELPHIA.

ALBERT FISHER, Agent for Cleveland. 77 & 79 Merwin St, Cleveland, O.

The American Tool and Machine Company.,

84 Kingston street, Boston Mass.,

—Manufacturers of the—

Celebrated Cabinet Turret, Screw Chasing, and Hand Lathes,

CHUCKS, SLIDE RESTS,

And Valve Milling Machines for Brass Finishers.

Also the D. M. Weston Hydro Extracters

For Woolen and Cotton Mills, Hotels, Laundries, etc.

30 BENJAMIN F. RADFORD, Supt.

Smith & Curtiss,

JOBBERS OF

TEAS,

COFFEES AND SPICES

ALSO PROPRIETORS OF THE CLEVELAND

Coffee and Spice Mills,

107 & 109 Bank Street,

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SAFETY STEAM, WATER & HAND POWER **ELEVATORS.**

GIVE HATCH SIZE, ELEVATION OF BUILDING, & SEND FOR ILLUSTRATED CIRCULAR

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105 MICHIGAN ST. CHICAGO.

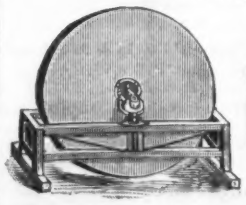
FINE WOOD PHOTO-ENGRAVING

SEND COPY FOR ESTIMATE IT WILL PAY YOU

CROSSCUP & WEST. 702 CHESTNUT ST. PHILA. PA.

JOHN H. O'MARA,

NEW LISBON, OHIO,



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GRINDSTONES

The best in the market

FOR WET AND DRY GRINDING,

AND FAST CUTTING.

Manufactured in sizes from 3 feet 6 inches to 8 feet in diameter; in thickness from 6 inches to 25 inches. Orders solicited.

82 JOHN H. O'MARA.

Excelsior Coal Co.,

Akron, Ohio.

Miners and Dealers in

EXCELSIOR LUMP, NUT AND SLACK.

Mines at Silver Creek, O., on N. Y., P. & O. R. R.

These Coals are Pronounced Among the Very Best by M. C. Read, Assistant State Geologist, and E. W. Morley, Professor of Chemistry, Adelbert College. 72

J. WAGONER, President. C. F. WAGONER, Secretary

Automatic Engines, 30 to 300 Horse Power.
Throttling Engines, 4 to 100 Horse Power.

Over 450 Engines and 10,000 Horse Power now in use.

Send for our Illustrated Circular and Reference List, and

ASK OUR PRICES.

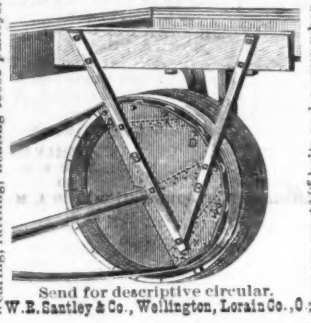
THE WESTINGHOUSE MACHINE COMPANY.

PITTSBURGH, PA.

Adress, if more convenient, our Branch Offices: 94 Liberty St., NEW YORK, 14 So. Canal St., CHICAGO, 401 Elm St., DALLAS, TEXAS.

THE WELLINGTON BELT HOLDER

HOLDS THE BELT AT REST when the machine is not in use, and in position to be instantly shifted back upon the driving pulley on line shaft at will. No more wearing, rattling, heating loose pulleys.



Send for descriptive circular.
W. R. Santley & Co., Wellington, Lorain Co., O.

No more waste of belts and power when machines are put in use. No more danger from shifting belts. Simple, durable, cheap. Agents wanted.

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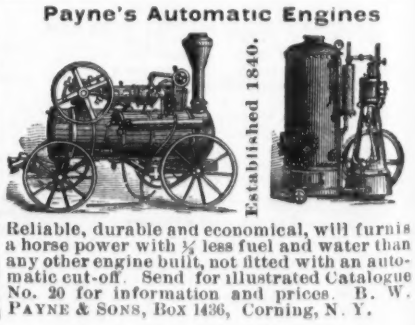
Can learn the exact cost of any proposed line of Advertising in American Papers by addressing Geo. P. Rowell & Co's Newspaper Adv'g Bureau, 10 Spruce St., N. Y.

Payne's Automatic Engines



Established 1840.

Reliable, durable and economical, will furnish a horse power with ⅓ less fuel and water than any other engine built, not fitted with an automatic cut-off. Send for illustrated Catalogue No. 20 for information and prices. B. W. PAYNE & SONS, Box 1436, Corning, N. Y.

TRAVELER'S REGISTER.

Lake Shore & Michigan Southern.

TRAINS GOING EAST.	Arrive. From West.	Depart. From East.
Fast N. Y. Express.....	*1 35 a m	*1 50 a m
N.Y.,Bo't'n & At. Ex.	*7 05 a m	*7 30 a m
Elyria Accommodation	†8 35 a m	.....
Pt.Clinton Accomd'at'n	†11 00 a m	.....
Buffalo Accommodation	†11 00 a m	†11 15 a m
N. Y and B't'n Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accom'dation	.....	†4 50 p m
Night Express.....	†10 10 p m	†10 35 p m

TRAINS GOING WEST.	Arrive. From East.	Depart. From west.
Fast Limited Express..	*12 23 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*3 05 a m
Chi. Ex. via Sandusky.	†6 35 a m	7 00 a m
Mich. Ac. via Norwalk.	.....	†6 40 a m
Conneaut Accom'dat'n.	†8 40 a m	.....
Toledo'Ex. via Norwalk	†1 25 p m	†3 30 p m
St. Louis Ex.via San'ky	*1 40 p m	*2 05 p m
Chi. Pac.Ex. via Nor'lk.	*7 05 p m	*7 35 p m
Pt.Clinton Accom'dat'n	.....	†5 00 p m

Sunday trains for Nottingham—Depart 0:00 a. m. and 2:15 p. m., return at 10:05 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex. *7 10	A.M
No. 8 C. L. & W. and Galion Exp.... 9 30	
No. 12 St. Louis & New York Exp..*3 20	P.M
No 6 Indianapolis & Columbus Exp10 00	
No 4 Columbus & Cincinnati Exp..*3 50	
No. 10 Wheeling Express 7 15	
No. 14 Cincin. New York fast line,..1 40	A.M

DEPARTURES.

No. 1 Cincinnati & Columbus Exp..*8 00	A.M
No. 11 Cleve, Indianap.&Wheel'g Ex 7 10	
No. 3 Special St. Louis & Cin. Ex...**2 15	P.M
No. 5 Night Express,.....*7 10	
No. 7 C. L. & W. and Galion Exp 5 00	
No. 17 Spec. Col. Cin'ti. Exp. 1 50	

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Lorain & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express.....7 15	P.M
Uhrichsville Express..... .... 9 30	A.M

DEPARTURES.

Wheeling & Cleveland Express..... 7 10	A.M
Uhrichsville Express 5 00	P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 1 New York Expaess.....* 6 40	a.m.
No. 7 Mahoning Valley Ac 11 55	a.m.
No. 5 Fast N. Y. & Pitts. Ex.....* 1 40	p.m.
No. 3 N. Y. & Pittsburgh Ex .....* 7 05	p.m.
No. 9 Youngstown & Pitts. Ac..... 10 15	p.m.

DEPARTURES.

No. 12 N. Y. & Pitts. Express.... ..* 7 20	a.m.
No. 6 Youngstown & Pitts Ac..... 11 05	a.m.
No. 4 Fast N. Y. & Pitts. Express..* 2 50	p.m.
No. 2 Mahoning Accommodation.. 4 35	p.m.
No. 8 N. Y. and Pitts. Express.... 11 05	p.m.

* Sunday trains.

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling....2 30	P.M	8 25 A.M
Express.....7 30		2 00 P.M
Alliance Accommodation10 10	A.M	3 45
Ravenna Accommodation8 37		5 30
Night Express 6 25	A.M	†11 40 P.M
Newberg Accom'dation..12 10	P.M	11 00 A.M
Newberg Accom'dation.. 1 50	P.M	12 36 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

	ARRIVE.	DEPART
Wheeling Junction.....10 15	A.M	8 30 A.M
Canton 1 35	P.M	6 15 P.M
Wheeling Junction..... 6 15	P.M	3 20 P.M

Special trains leave on Sunday at 4.20 P.M., arriving at Cleveland at 7.15 P. M.

Depot foot of South Water Street.

Connotton Valley Railway.

Trains leave Cleveland,	A. M.	P. M.
Canton & Sherrodsville *7 30		2 30
Canton, Coshocton & Sherrodsville		2 30
Canton & Coshocton.....7 30		4 10
Kent accommodation.....*10 35		8 00
Trains arrive:	A. M.	P. M.
Canton & sherrodsville.....10 15		
Canton & Coshocton.....		1 25
Canton, Coshocton & Sherrodsville		*7 30
Kent accommodation.....*8 05		7 50

Newburgh depart at 8:05 a. m., 11:20 a. m., 6:15 p. m.; Newburgh and Bedford depart at 11:00 p. m.

Newburgh arrive at 8:55 a. m., 4:45 p. m., 7:00 p. m.; Newburgh and Bedford arrive at 6:45 a. m.

Trains run daily except Sundays. *Trains daily. Depot corner Huron and Ontario streets.

Cleveland, Akron & Columbus Railroad.

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail... ..... 2 30	P.M	8 25 A.M
Express 7 30		2 00 P.M
Accommodation 10 10	A.M	3 45 P.M

"The Nickel Plate."

	ARPIVE.	DEPART
Local Passenger.....10 00	P.M	3 48 P.M
Local Passenger..... 9 18	A.M	6 55 A.M
Conneaut Accom'dation. 9 05	A.M	4 30 P.M

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

Formerly Atlantic & Great Western Railroad]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh Washington, Baltimore and the Southeast.

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7 20A.M. LIGHTNINGEXPRESS(daily) sleepingand hotel coaches from Leavittsburg. 9:05 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p. m.; Buffalo, 6:15 p. m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p. m. (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m. Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

2:50P.M. LIMITED EXPRESS, Pull-Sleeper Cleveland to New York, (daily). Arrives at Meadville, 6:55 p m.; Jamestown, 9;13 p. m.; Salamanca, 10:10 p. m.; Now York, 10:25 a. m.

11:25 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsurg to New York without change. Arrives at Youngstown, 1:45 a.m.; Pittsburgh, 6:15 a. m.; Washington 9:15 a. m. Baltimore 10:34 p. m.; Meadville, 3:50 a. m. Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a. m.; Rochester, 1:10 p. m.; Hornellsvillle 1:20 a. m.; Corning, 12:53 p. m.; Elmira 1:21 p. m.; Binghampton, 2:50 p.m.; New York 9:25 p.m.

2:50 P.M. PITTSBURGH EXPRESS, daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:19 a.m

4:35 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p. m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:20 A.M. PITTSBURGH EXPRESS, —(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p. m. and 4:20 p m.

11:05 A.M. YOUNGSTOWN& PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:40 a.m., 7:05 p. m., 10:55 a. m 1:40 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK,
Gen. Pass'r. Agt., Cleveland, Ohio.

J. M. FERRIS, Gen. Man'gr, Cleveland — M. L. FOUTS, Pass. Agt., 131 Bank st., Cleveland.

TIME TABLE.
CLEVELAND & PITTSBURGH
RAILROAD.

On and after Sunday, January 21st, 1883, trains depart from and arrive at Union Station, Cleveland, (city time) as follows:

DEPART.

For the East--8:20 A.M.; 1:55 P.M., 11:35 P.M
For Alliance--3:40 P.M.
For Ravenna--5:25 P.M.
For Newburgh--10:55 A.M; 12:25 P.M.
On Sunday for the East, at 11:35 P.M.

Train leaving for the East (week days) at 1:55 P.M. has sleeping car through to Philapelphia and New York.

Train leaving for the East every night at 11:35 has sleeping car to Pittsburgh.

On Saturday night the train for the East leaving Cleveland at 11:35 runs from Alliance to Pittsburgh via P.F.W. & C. Railway.

ARRIVE--(Week Days.)

From the East--6:20 A.M.; 2:25 P.M.; 7:25 P.M
From Alliance--10:05 A.M.
From Ravenna--8:32 A.M.
From Newburgh--12:05 P.M.; 1:45 P.M.

Time tables, rates of fare, through tickets and further information can be obtained from M. G. Carrel, agent, Union Station, or C. L. Douglass, No. 212 Bank street.

WM. A. BALDWIN, Manager. E. A. FORD, Gen. Pass. Agt. Pittsburgh, Pa.

Bee Line.

Cleveland, Columbus, Cincinnati & Indianapolis Railway.

The Great Central Trunk Route to the Ohio and Mississippi Rivers.

Three Trains Week Days,

TWO TRAINS SUNDAY.

Leave Cleveland with Through Palace Coaches and Elegant Sleeping Cars for

Columbus, Cincinnati, Indianapolis, Terre Haute and St. Louis

Without Change.

This is the only line making Direct Connection with all the principal Trunk Lines of the East for all Southern, Southwestern and Western points, either by way of Cincinnati, Indianapolis or St. Louis for all railway towns in Missouri, Arkansas, Texas, Kansas, Nebraska, Colorado, New Mexico, Old Mexico and the Pacific Coast.

Equipment New and Comprising all Modern Improvements.

The Best Roadbed and Safest Road in the West.

Tickets by this popular route for sale at all regular ticket offices.

E. B. Thomas, General Manager. **O. B. Skinner,** Traffic Manager.

A. J. Smith,
Gen'l Pass. Agent, CLEVELAND, O.

Office of the Commissioner
Of Railroads and Telegraphs.

COLUMBUS, O., June 27th, 1883.

E. T. AFFLECK, ESQ.,
Gen'l Pass. Ag't., C. A. & C. R. R.,
COLUMBUS, O.

DEAR SIR:—In reply to your note concerning the condition of your railway, I am glad to state that the State Inspector of Railways, who has been charged with the examination of the Cleveland, Akron & Columbus R. R, has some time since submitted his views upon the road.

With the carefully made report of Engineer Ruhlen before me, I find myself warranted in assuring you or anyone interested in the condition of your road, that within the last two years you have brought the road up to a remarkably fine condition, comparing well in the matter of pleasant traveling and safety with some of the best roads in Ohio. Your bridges are mostly new and remarkably strong. Your road-bed has been thoroughly repaired by the laying of steel rail and large supplies of new ties, and by ballast and side ditches. I am happy to say that the road is now in a most excellent and safe condition for the transportation of passengers, and I have no hesitation in commending it to the traveling public.

I am, sir, respectfully yours,

H. SABINE,
Comm'r. of R. R.'s and Tel's.

THE NICKEL PLATE.

New York, Chicago & St. Louis Railroad.

The passenger equipment of this new trunk line is all new and is supplied with the latest appliances necessary to safe, speedy and comfortable travel.

At Chicago, Passenger Trains arrive at and leave Union Depot, Van Buren street.

Following is the time in effect Sept. 9, 1883, and until further notice:

GOING EAST.

	Local Pass'n'gr	Local Pass'ngr.	Conneaut. Accom,
Lv. Chicago.....	8 15 am	.....	.....
Ar. Valparaiso..	10 05	.....	.....
" Ft. Wayne ..	1 30 pm	.....	.....
" New Haven .	2 05	.....	.....
" West Leipsic	4 15	.....	.....
" Arcadia	5 12	.....	.....
" Fostoria....	5 25	.....	.....
" Gr. Springs.	6 12	.....	.....
" Bellevue....	6 40	.....	.....
Lv Bellevue	6 55	8 30 am	.....
Ar Cleveland...	9 30 pm	11 00	.....
Lv Cleveland...	.....	11 05	4 20 pm
Ar Painesville	.....	12 11 pm	5 32
" Ashtabula...	.....	1 18	6 28
" Conneaut....	.....	1 50	6 55
" Erie.....	.....	2 51	.....
" Dunkirk	.....	4 25	.....
" Buffalo	.....	6 00	.....

GOING WEST.

	Local Passn'gr.	Local Pass'ng r.	Con'eaut Accom.
Lv Buffalo.....	10 15 am	.....	.....
Ar Dunkirk	11 56	.....	.....
" Erie	1 50 pm	.....	Leave.
" Conneaut	2 50	.....	6 45 am
" Ashtabula....	3 17	.....	7 14
" Painesville ..	4 11	.....	8 11
" Cleveland...	5 20	.....	9 25
Lv Cleveland...	5 25	7 15 am	.....
Ar Bellevue	7 55	9 30	.....
Ly Bellevue	.....	9 40	.....
Ar Gr. Springs..	.....	10 07	.....
" Fostoria.....	.....	10 46	.....
" Arcadia.....	.....	11 00	.....
" West Leipsic	.....	11 55	.....
" New Haven.	.....	2 05 pm	.....
" Ft Wayne ..	.....	2 20	.....
" Valparaiso..	.....	6 23	.....
" Chicago.....	.....	8 20	.....

ROCKY RIVER ACCOMMODATION.

Departs 7:50 a. m., daily; 9:25 a. m., daily; 10:55 a. m., Sunday only; 1:43 p. m., daily; 4:25 p. m., Sunday only; 7:00 p. m., Sunday only.

EUCLID ACCOMMODATION.

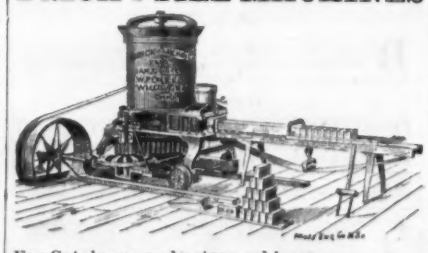
Departs 12:20 p. m., daily; 5:45 p. m., daily, except Sunday; 8:35 p. m., Sunday only.

Trains run by Columbus time, which is twenty minutes faster than Chicago, five minutes slower than Cleveland, and sixteen minutes slower than Buffalo time.

For information, call on nearest Agent of the Company or address

B. F. HORNER,
Gen'l Passenger Agent,
LEWIS WILLIAMS,
General Manager, Cleveland O.

BRICK and TILE MACHINES



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J. W. PENFIELD,
Willoughby, Ohio.

Mention this paper 81

T. NEW'S
Prepared
Roofing.

For Steep or Flat Roofs.

Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW,

32 John Street, New York.

Beaver Falls Steel Works.

BEAVER FALLS, PA.

Manufacturers of all kinds of STEEL. Special "Beaver" Tool, Die, and Axe Steel, Iron Center, Soft Steel Center, and Cast Plow Steels. Open Hearth Bessemer Agricultural Steel Shapes. Finished Rolling Coulters and Patent Cutlery Steel. 82

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Manufacturers of

High and Low Speed

Stationary Engines

BOTH

UPRIGHT AND HORIZONTAL

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CIRCULAR SAW MILLS.

STEAM PUMPS,

IRON AND BRASS CASTINGS.

Patent Sets and Head Blocks for Saw Mills, and Machinery of all descriptions. I now have the agency for the celebrated

Watertown Portable Engines & Boilers,

and can supply customers with anything in this line at very low prices.

Call at Works and see them in Stock.

Also manufacturers of

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These are an entirely new style of Upright Engines, designed by F. I. Freeman, and

PATENT APPLIED FOR.

They are so constructed that they can be sold for one-half the price for the ordinary style of the same sizes or power, consequently they are by far the

Cheapest Engines in the Market

And are warranted satisfactory in every respect. They are designed especially for Saw Mills, Grist Mills and Hoisting Machines, and are high or low speed engines, running from one to seven hundred revolutions per minute; are strong and heavily built, of the best material and workmanship.

☞ Parties interested will find one in operation at the works. Call and examine for yourselves. Sizes range from eight to one hundred horse power.

Also dealers in Gas and Pipe Fittings, Globe Valves, and

Second-hand Machinery of all kinds

Prompt Attention given to Repair Work.

☞ Parties wishing to buy or sell second-hand Machinery will do well to call.

Corner Vernon and Hudson Streets,
(Opposite N. Y. P. & O Freight Depot.
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PATENT

Expanding Water Conductor

MANUFACTURED BY THE

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LIMITED,

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THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the cave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and water-tight.

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Cleveland Business Directory.

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JUDSON, W, E, Ana ytical Chemist, 81 8 Cushing Block.

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ANDREWS, HITCHCOCK & CO., Briar Hill, Coal and Pig Iron. 101 St. Clair St. 81

JACKSON IRON CO. Iron Ore and Pig Iron. Fayette Brown, Gen. Agent. 101 St. Clair street. 15

RHODES & CO. Coal, Iron Ore and Pig Iron. 101 St. Clair street. 1

DALLIBA, J. H., Iron Ore. Grand Arcade Building, 101 St Clair st. 51

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts. 41

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection. 41

Dyers.

BICHLMYER, A., 122 Sene st, Gentlemen's and Ladies' Clothes Cleaned and Dyed. 74

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws. No. 11 South Water street. 51

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins. 74

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st. 61

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way. 33

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway. 64

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow. 48 and 50 River street. 33

Hardwood Lumber.

MARTIN & BARRIS, dealers in all kinds of Hardwood Lumber. 130 Central Way. 51

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

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Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st. 4

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath, shingles, etc. 47 Central Way. 81

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Machinery and Boilers.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street. 71

Mercantile Agency.

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AMERICAN LUBRICATING OIL CO. manf'rs of lubricating oils, 23 Euclid ave, 84

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Cleveland Business Directory.

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Business Directory.

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TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc. 04

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street. 84

CAHOW BROS. manfrs. of and dealers in Wood and Metal Pumps, Pipe, etc. 225 West Market street. 42

MAY & FIEBEGER, Galvanized Iron Cornices. Send your plans for estimates. 62

Alliance, O.

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing. 41

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot & power lathes, 70 Columbia st. 33

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio. 83

WHITE, L. & I, J. manf'r's of Coopers' Tools. Carpenters' Tools, and Ship Tools Also manf'r's of Planer Knives and Machine Cutters to order 310-314 Exchange street. 33

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ATLANTIC HOTEL, directly opposite the Railroad Depot. D. Foland, proprietor. W. Foland, H. W. Terrell, Clerks; Wm. Richardson, Night Clerk. 2

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THE SUN VAPOR LIGHT & STOVE CO., manufacturers of Vapor Gas Lights, Gasoline Stoves and Tinner's Soldering Furnaces. Contractors for lighting the streets of cities and towns. No. 116½ E. 5th Street 72

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CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co. 03

ZELOTES WOOD & CO., manfrs of Malleable Iron. Cor. Randolph and West streets. 13

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SNYDER, H. wholesale manufacturer of Sash, Doors, Blinds, &c. Send for Price Lists. 71

THE CUYAHOGA FORGE AND IRON CO. manfrs. of every description Car, Truck & Driving Axles, Forging, Shafting. 71

Cincinnati, O

THE CINCINNATI STEAM HEATING CO. mfrs, dealers and contractors. Warming and Ventilation of public and private buildings a specialty. Boilers, Radiation, Pipe, Fittings, Brass Goods, &c. Correspondence solicited. 187 West Pearl street. 92

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Business Directory.

Niles, O.

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Olean, N, Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc. 72

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REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice. 2

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GOWE, JNO. N., mfrs. of Specialtics, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisel, &c. 23

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. Graham & Co. 43

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Toledo, O.

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RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Corner Water and Lagrange streets. 84

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss, Springs, &c. made to order. 92 St. Clair St. 3

UNION Manufacturing Co., manufacture Sewing Machines, Wash-boards, Children's Wagons, Carts, Wheelbarrows, Sleds, Kitchen Wooden ware, &c. 3

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Youngstown, O.

BELL, EDWIN & SONS, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock. 1

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Improved Joint

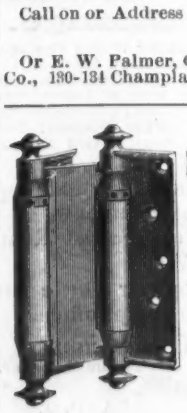
FOR GLASS, ETC.,
FOR ROOFING HOT-BEDS
GREENHOUSES, ETC

Applicable to Vertical or Inclined Surfaces, with thick glass, slate or tile,

Making the Roof Impervious to Water, Dust, Cold or Snow.

Call on or Address WM. WARD, 827 Broadway,

Or E. W. Palmer, Cleveland Window Glass Co., 130-134 Champlain Street, Cleveland, O 91



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SPIRAL SPRING HINGE,

has the lightest and

Most Elastic Movement

combined with

THE GREATEST POWER.

Manufactured by

LORENZ BOMMER,

4 Pearl Street, cor. Front,

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READY for IMMEDIATE DELIVERY

Two Speed Lathes, 13⅛ inches x 4 ft. with 12-inch slide rests.

Two 13⅛ inch x 4 ft. Turret Lathes, with cut off and automatic chucks.

One 2 inch Cast Steel Bolt Cutter Head, with full set of dies from ¼ to 2 inches.

One ⅝ inch Bolt Cutter Head, with full set of dies.

Orders for special machinery solicited.

JAMES AITCHISON, Machinist,
43 108 Canal Street, Cleveland, O.

FOR SALE.

MALLEABLE IRON WORKS

of Akron. Two large Annealing Ovens with equipments for same; Japanning and Tinning Rooms; good Boiler and Engine of 25-horse power; machine and store house two stories, 25x50 feet, containing pulleys, hangings, benches, polishing barrels, etc.; Moulding Foundry 50x70 feet, including cupola, ladles, crane, core-oven and air-furnace with a fine high stack.

Four buildings and one acre of ground well located. Shipping facilities the very best. Buildings and machinery all nearly new. The whole will be sold at a bargain and on reasonable terms of payment. Enquire of

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One Speed Lathe, 13 in. swing, iron bed, 6 ft. long, 5½ in. deep. An excellent tool; in perfect order

One Foot Power 10 in. Swing Lathe, 4 ft. bed; 30 in. between centers.

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The Engines are mounted on an A frame, bolted to a strong bed-plate, and by the side of the boiler, but not dependent upon the boiler, making the most convenient double engine, taking up less space, and can do more and better work than any other of the same dimensions.

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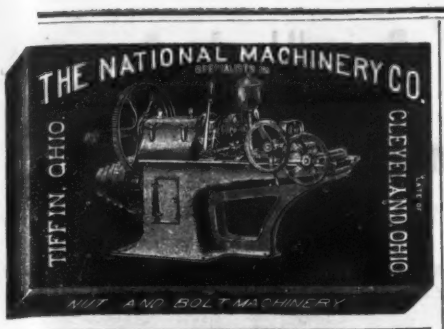

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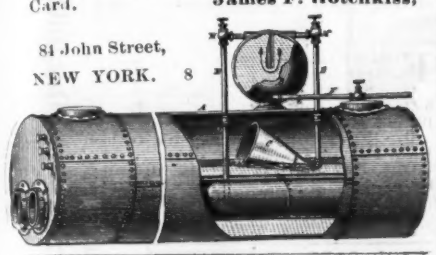
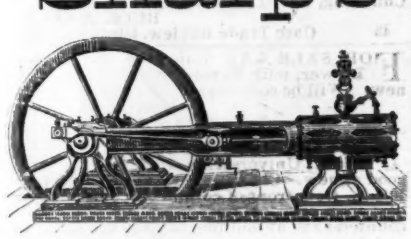


Sharp's



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Cut-off Engine

HAS NO EQUAL AS A FUEL SAVER.

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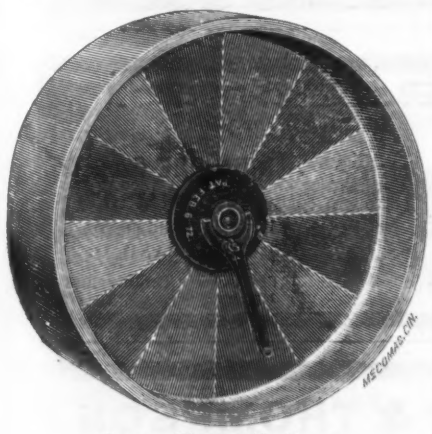

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MANUFACTURERS of Taper-Sleeve Wood Belt Pulleys, Taper Sleeve and Compression Couplings, Adjustable Dead Pulleys, Wood Pulleys Split or made in Halves, Friction Clutch Pulleys, and Friction Clutch Couplings. You can start a load with this clutch, at any speed, with ease and safety.

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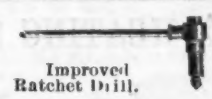

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Die Stock.

With it pipe as large as 6 inches can be threaded or cut to length by one man.

No vise is required to hold the pipe. The bits open when the thread is cut.

The bits are sharpened by simply grinding.

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Specially Designed for the Western Market.

OVEN NO. 8—20x21¼x13 Inches. OVEN NO. 9—22x23½x14 Inches.

Has peculiar and important features that make it the best operating stove in the market, and commend it to the favorable notice of dealers who desire a first class stove.

It is constructed with our patent flue, which descends in the rear and ascends in front between oven and fire-box, forming a wide flue around back, bottom and front of oven, insuring an easy draft and uniform heating of all parts of oven.

The Reservoir is of planished copper, with deep, stamped pit, protected with cast iron, and is effectually heated without an extra damper. By removing Reservoir and supplying its place with cover plates, a complete six-hole stove is obtained

The fire-back is in three heavy interchangeable pieces. A water-back is provided which occupies the same space as fire-back, heats perfectly and does not retard the heating of oven, for reasons of the intervening flue between it and oven.

The grate is hinged at its extreme back edge, and when dumped gives a clear opening into a large ash-pan. It can be partially dropped to remove clinkers from the front.

A receptacle for the covers, when removed from top of stove, is hung on swing bracket under front hearth.

Its neat design, nicely polished edges, nickeled panel plates and trimmings, give it a very attractive appearance

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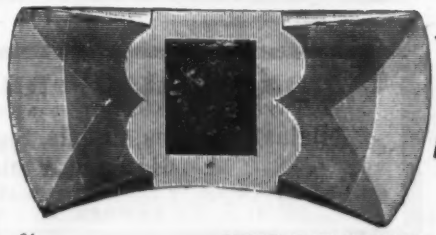

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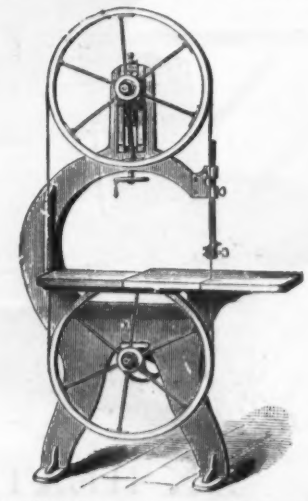

We build three sizes of this machine

with 26, 30 and 38 inch wheels.

The two smaller sizes will saw hard wood 12 in. thick, the largest 16 in. thick. They are made of the best material and are well made. For further information address

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WOODWORKING MACHINERY,

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THE CELEBRATED XX HEATING STOVE.

Manufactured Exclusively by JOHN RONEY, Hecla Foundry, Twentieth Street 12th Ward, Pittsburgh, Penn'a.

XX HEATING STOVE.

	Diam. of Bottom.	Diam. of Fire Chamber.	Height of Stove.	Weight.
No. 5, XX,	26 inches.	18 inches.	40 inches.	180 pounds.
No. 6, XX,	30 inches.	19 inches.	42 inches.	255 pounds.
No. 7, XX,	34 inches.	21½ inches.	48 inches.	380 pounds.
No. 8, XX,	36 inches.	24 inches.	53 inches.	540 pounds.
No. 9, XX,	36 inches.	26½ inches.	57 inches.	800 pounds.

Your attention is called to our CELEBRATED XX HEATING STOVE, which we guarantee is surpassed by none in the market for cheapness, durability, and heating purposes. It has been in the market for the past 16 years and has always given the best of satisfaction, and is particularly adapted for Hotels, School Houses, Churches large Offices, Machine Shops, R.R. Depots, Round Houses, &c. The dimensions and weights are just as represented. Should you be in need of a large size heating stove we would specially recommend the Nos. 8 and 9.

Write for Prices and Circular of heating and cooking stoves. 15

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Perfect Safety Secured in Walking on Ice or Slippery Pavements.

"A" represents the Creeper in position ready for use. The dotted line "B" shows the Creeper thrown back entirely out of the way when not in use, or walking indoors.

This Creeper has advantages over all others.

Its simplicity of construction, being easily adjusted, always ready for use, and when not needed can be instantly turned under the "Shank" out of the way, therefore not interfering with walking in the house on carpets, etc. When in position for walking on ice it is a sure protection from falling.

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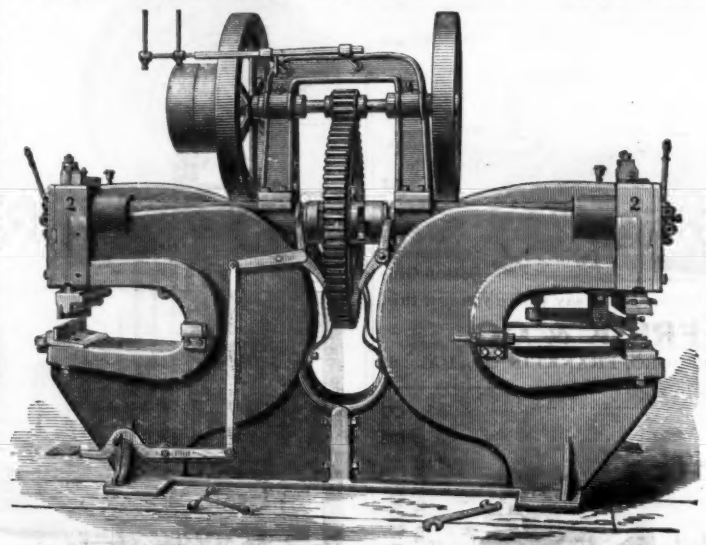
Power Punches, Shears and Hammers.

Adjustable Helve Cushioned Hammers.



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We make over 100 sizes of Punches and Shears. Double and Single, varying from 500 to 36,000 pounds in weight, and adapted for every variety of work. The Double machines are equal to two Single ones as each side is worked independently.

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Iron Shingles, Double Cap, Corrugated, Crimped, Bead.

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Send detail Drawings by mail or express, at our expense, for estimates.

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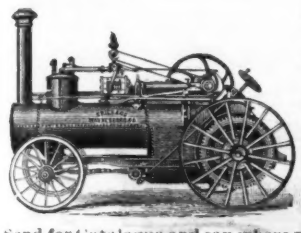

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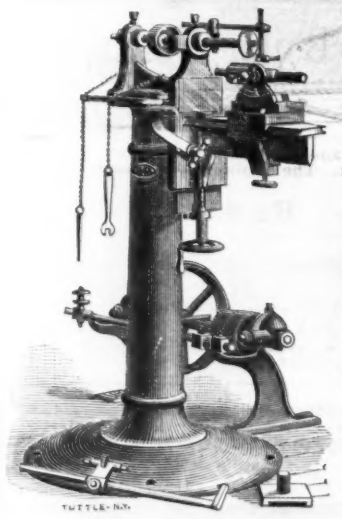

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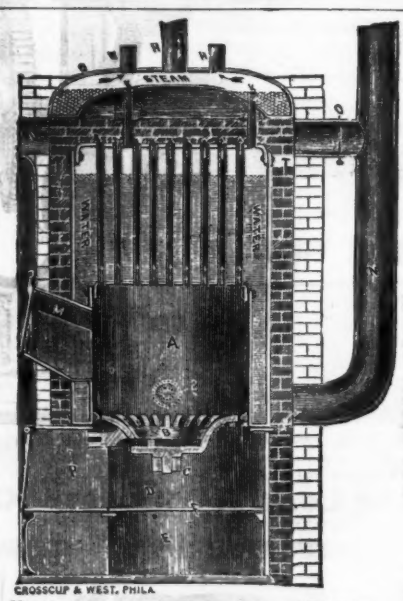

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A PERFECT SUCCESS

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24 Sizes Low-Pressure Generators,

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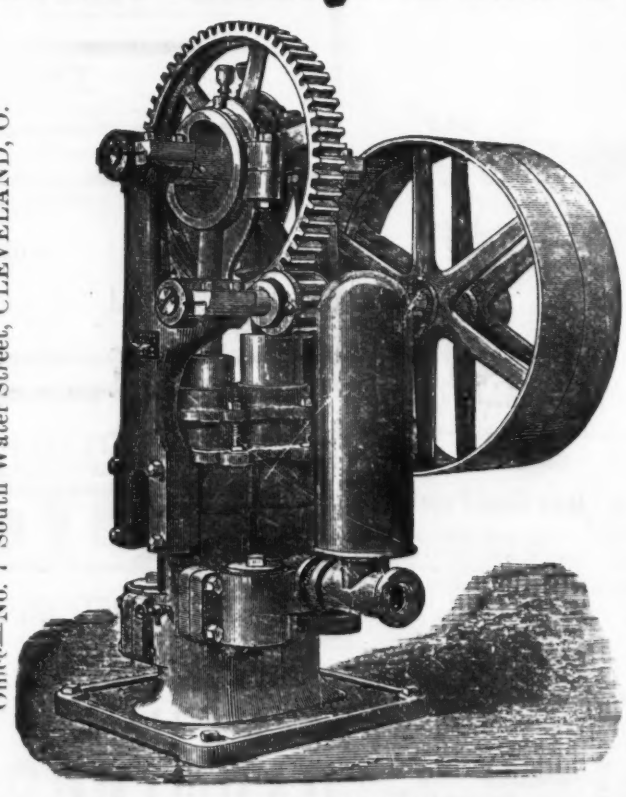

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Arthur Kirtland, Agt.,
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Respectfully,
BUCHER, GIBBS & CO.
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Send for prices.

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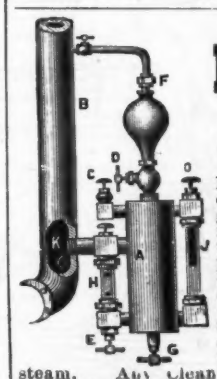

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SIGHT FEED

LUBRICATOR CUPS.

For oiling valves and cylinders of steam engines, by the only perfect method, through the steam pipe. The oil passes in sight, drop by drop, into the column of steam where it vaporizes, thus becoming a STEAM LUBRICANT, oiling perfectly every part reached by the steam. Any clean Oil, black or white, light or heavy, may be used. Saves from 50 to 90 per cent. in oil and wear of machinery, thus paying for itself several times a year. A cup will be sent to responsible parties on twenty days' trial if desired. In ordering give diameter of cylinder.

NOTICE.

The first lubricators ever made, showing the oil passing drop by drop through a transparent water chamber, were devised by us, and the same are fully embraced by many Letters Patent owned and controlled by us, which have been sustained in several hotly contested legal contests. Our customers, therefore, need have NO FEARS in their purchase and use. We are the sole owners of the "Sight Feed" feature as claimed by us, and we shall hold purchasers and users responsible who are encroaching upon our rights by the unlawful use of our device.

DETROIT LUBRICATOR CO.
Office 98 Griswold street, Detroit, Mich.

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PLATING WORKS.

Stove Work a Specialty.

Cold, Silver and Nickel Plating. Work Guaranteed. We employ Improved Methods of our own in treating this work. Write for prices.

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FOOT POWER HAMMER

—OR—

OLIVER.

Patented July 10, 1883.

It is especially adapted to making

CARRIAGE

And other light Forgings.

Weight 500 pounds.
Send for Circular.

CAPITAL CITY MACHINE WORKS,

Manufacturers of Punching Presses, Emery Grinders, Cornice Brakes, etc.

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S. A. SMITH, Agent for Western States,
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THE

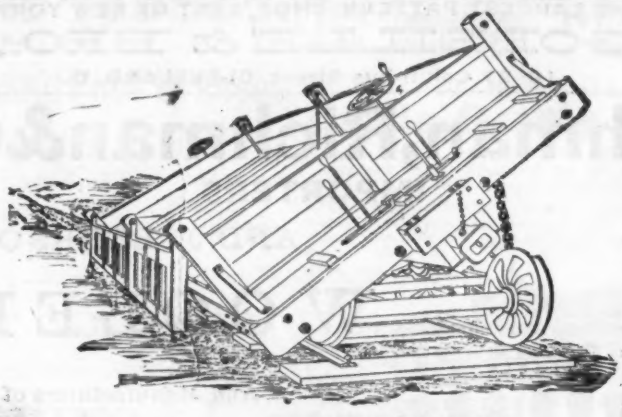
United States Car Co.'s

SCREW LEVER

Dump and Coal Car.

(M. VAN WORMER'S PATENTS.)

C. L. VAN WORMER,
General Manager.



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This Car has a capacity of 18 to 20 tons,
AND CAN BE HANDLED BY ONE MAN,
DISCHARGING ITS LOAD INSTANTLY.

The device can be applied to flat cars. The car is under perfect control at all times, and can be held at any elevation or dumped suddenly if desired. For construction trains, cars with this device would be invaluable

The Mechanism is Strong, Simple and Durable

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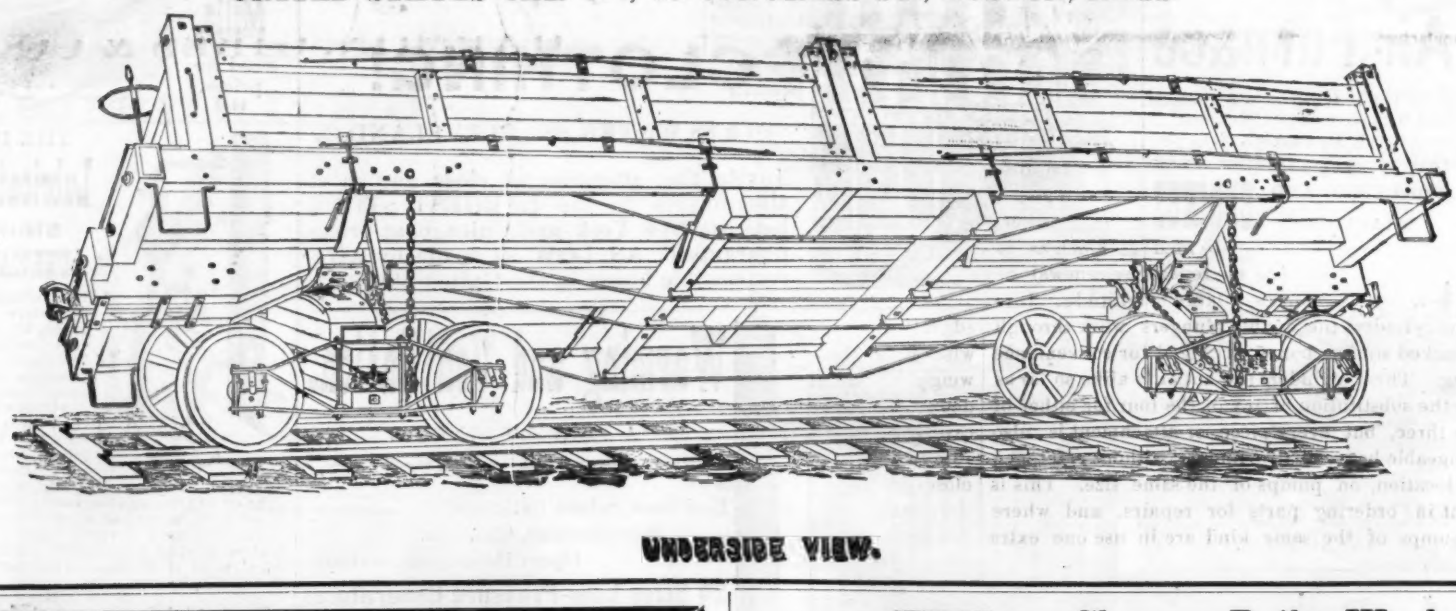

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Manufacturers of All Kinds of
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Prompt Attention Given to Repairing.
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The Griffin Road Machine Co.

MANUFACTURERS OF

Road and Track Machines,

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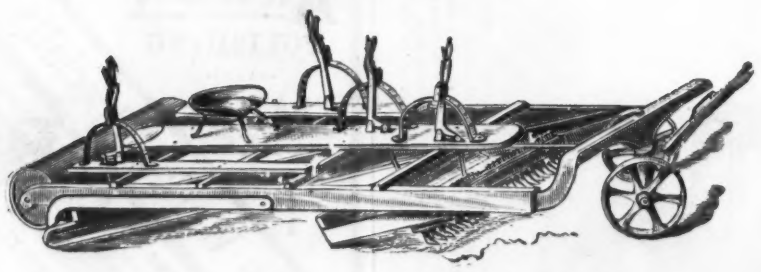

CITY SURVEYOR'S OFFICE,
LANSING, MICH., May 3, 1883.

The Griffin Road Machine Co.
Gents.—We have had your machine running for a month, and are highly pleased with it. It has already more than paid for itself by the saving of labor.
H. D. BARTHOLOMEW,
City Surveyor.
22

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Trade Mark Patented—Paint Patented

Order direct from the
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And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof, and CHEAPEST PAINT MADE.

Furnished both Dry and Ground in Oil.

Used by nearly all the Railroads. 63

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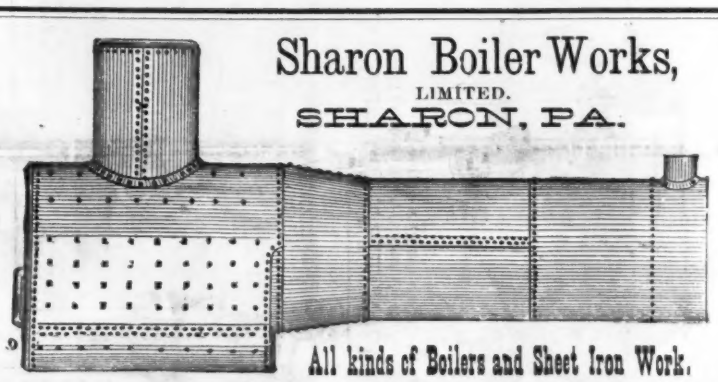

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